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#### PREFACE

Design is an act of integration. This idea has been a personal pursuit of mine with each new landscape presenting itself as a canvas to explore this idea. As the Chairperson for the 2017 IFLA APR Regional Congress, it is an honour to invite speakers and delegates from around the world to share their ideas about landscape architecture, urbanism, and art and design in the contemporary world. Landscape Architects are, in my opinion, an indispensable profession that is able to research, contemplate, and posit new approaches to global warming, loss of biodiversity, liveable cities, rural welfare, and related issues facing blue, green, and cultural landscapes across Asia Pacific and the world.

The IFLA APR group includes some of the most populous, dense, and diverse countries in the world and I believe that we have more that connects us than separates us. My home city of Bangkok is a rapidly changing and cosmopolitan city faced with its own unique challenges but I believe that collaboration with a mind to learn from each other can create a strong body of knowledge that professionals across the region - and the world - can draw from.

Together with the organising committee and the Thai Association of Landscape Architects (TALA) we welcome you to Bangkok and the 2017 IFLA APR Regional Congress in November.

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### PREFACE

Landscape Architecture was born to serve the earth, nature and humankind. Our integration of scientific progress through history has always adhered to our core values of protecting nature and the environment. As the environment has degraded to dangerous states, we saw other disciplines slowly converging on a shared direction of "sustainability" and we benefit from them as we were move ahead on our long-held path to the resolute goal of reconciling "humankind" with "sustainability". Our main theme of this year's symposium, BLUE, GREEN and CULTURE needs no further elaboration, as all landscape architects understands the meanings by heart and intuition.

It is time for us to come together to share our thoughts, concerns, designs, knowledge and perspectives from our own individual diverse interpretations of the subject in the forms of academic papers, essays, ideas and design works. We are grateful to our keynote speakers, paper and idea presenters, and congress participants for an exciting opportunity to share, express, and exchange among our fellow professionals and academics of various nationalities. It is by no means a coincidence that the symposium ends on the Full-Moon Day of the Twelfth Lunar Month (Loy Krathong Night) when the tide is at the highest level all over the country. It is the night that our ancestor expresses their mindfulness and pay respect to the water and streams by congregating and celebrating where the water meets the land. Hopefully, every participant is able to join the beautiful festival and experience first-hand how the blue meet the green in our cultural context.

Our committee is grateful to the IFLA APR 2017 Congress Organizing Committee (OC) for allowing us opportunity to be a meaningful part with academic freedom. The OC and TALA ( the Thai Association of Landscape Architects ) has provided us with facilities, resources and swift policy decisions when needed. We express our heartfelt gratitude to all capable landscape architects who have taken part in this Congress. May they be the committee members, paper reviewers, editor and supporting staffs on all duties who have devoted their own personal time and effort out of their already impossible schedule to come together and make all these complicated tasks accomplished. Most importantly, we thank all the congress participants who are the heart of this event.

On the last note, all effort and strength of our committees are devoted in remembrance of our most revered King Bhumibol Rama IX whose name literally translated to "The Strength of the Land" in Thai. Our beloved father who devoted his entire reign to tirelessly applying and studying the nature and sciences of soil and water for the betterment of mankind. Let us reminisce upon his dedication again on this coming 5th of December, His Majesty's birthday and The World Soil Day declared by the United Nations in recognition to His Majesty the beloved King Bhumibol.

Scientific Committee 2017 IFLA APR Congress In Thailand during the past decade, Landscape architecture as a profession saw increased role in both public and private sectors as one of the major mechanism in the country's development. Particularly in Bangkok metropolitan area, landscape architectural design has proven to help improve the quality of life for the people through effective management of green area and matriculate design of the physical environment. Under the enactment of the law for the Environmental Impact Assessment (EIA), landscape architects were more involved in urban planning, public space management, development of green area, and the using of landscape innovation to decrease energy usage as well as mitigate CO2 emission. Most recently, landscape architecture profession was called upon to collaborate in the design of the Royal Crematorium for His Majesty King Bhumibol Adulyadej and bestowed with an important task in manifesting the love and respect of Thai people for the most revered king through the landscape architectural design.

Bestowed with such important tasks, it is therefore essential for landscape architects to keep abreast of advancement in technology as well as ever-changing socio-cultural dimension of the country. IFLA APR Congress is an important event for landscape architects not only in Thailand but the world over. It is an opportunity to open a discourse and explore significant emerging themes, which in this year: Blue and Green Landscapes and Cultures that seeks to find harmony between evolving culture and the environment. The conference offers discussion in various dimensions both educational as well as professional through key note speakers, paper presentations, idea presentations, and student competition.

For Thailand, the success of the conference would not only further establish the importance of landscape architecture as a significant mechanism in developing the country to be the leader in Asia Pacific region, but would also be the opportunity to welcome landscape architects from all over the world to immerse in the soul of the city designed within the framework of harmony and sustainability as inspired by the Philosophy of Sufficiency Economy given to Thai people by our beloved King Bhumibol Adulyadej.

Pongsak Laomanachareon

President Thai Association of Landscape Architects

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SECTION 1 LANDSCAPE AND URBANISM

## PEDI-URBAN: Uplifting the Urban Spaces thru a Pedestrian Friendly and Bike Oriented Streetscape

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#### ABSTRACT

In Taipei, Taiwan, the YouBike system is among the successful bike sharing program in Asia. This kind of system is an innovative scheme as mode of transportation in urban areas and can be seen as part of the public transport system. In the Philippines, the MMDA bike sharing program is the latest bike sharing system being implemented in Metro Manila and can be seen in some parts along EDSA.

An analysis regarding the existing condition of the bike lane and the MMDA bike sharing program was made. Factors like narrow and obstructed bike lane, unavailability of bike in specific bike terminals and lack of appropriate streetscape design were among the reasons why the MMDA bike sharing program is still unsuccessful up to now. A survey was also done in order to find the level of acceptance of such bike sharing program from different individuals and their purpose in using this bike sharing program.

This study is about the redevelopment of the existing bike lane and proposal of a new elevated bike lane in EDSA-Santolan to EDSA-Ortigas. Currently the existing bike lane is a two-way bicycle lane shared with pedestrians. The proposal of the study is to redevelop the existing sidewalk along EDSA-Santolan to EDSA-Ortigas by separating pedestrians and cyclists thru a proposal of a new elevated bike lane. The existing bike lane will be redevelop into a sidewalk with landscape design elements integrated with an elevated bike lane that will be the new location of the MMDA bike sharing program.

Keywords: Pedestrian-Friendly: Walkability: Bike Sharing Program: YouBike System

#### BACKGROUND OF THE STUDY

To reduce the environmental impact and the congestion of road due to high volume of cars, many cities have adopted public bike rental system and a walkable streetscape to promote people to walk and/or use bicycle as their mode of transportation. Bike-sharing, or public bicycle program like the YouBike system is an innovative idea to uplift the streetscape in urban areas and can be seen as part of the public transport system. The YouBike system were integrated with a pedestrian-friendly sidewalks that is properly located and directly connected to other modes of transit like the bus and railway transit. The Department of Transportation, Taipei City Government, in order to encourage citizens to use bikes as short-distance transit vehicles, launched the Program of the "Establishment, Operation and Management of Bike Sharing System" since 1998, in the hope that by equipping a urban bike lane network with a bike station service, encourage citizens to use low-pollution and low-energy-consumption Bike Sharing as short-distance transit vehicles and reducing and replacing personal possession and use of motor vehicles, traffic congestion, environmental pollution and energy loss in the city will be improved. The Taipei City Government, upholding the philosophy of green transport, resolutely invested seven years' resources in building the biggest unmanned bike rental system in Taiwan (162 stations

and 5359 Bike Sharing).<sup>3</sup>

In the Philippines, Marikina City was identified for a demonstration project. A \$1.3 million grant from World Bank and a large Global Environment Facility grant was given for the implementation of a pilot bikeways project. The project was a 66 km of bikeways (along existing roads and river banks); 49.7 km of segregated bikeways on existing roads, and 16.6 km of bikeways along the Marikina River, connecting to the LRT station.

Although a feasibility study and a network design study have been prepared for the bikeways project when it commenced, there was a problem of acceptance from the city engineering group and the city council in designating and declaring certain roads as bikeways. This was due to the perceived constraints that the new facility will impose on the city's narrow roads, limited road parking spaces and reduced road capacity for motorized traffic.

The Marikina Bikeways network construction was gradually implemented adopting an "experimental approach" wherein the city engineers deployed what was only workable and acclimatized them to inevitable specificities. The intent was to allow opportunity of evaluation and adjustment in the course of the bikeway construction. But apart from providing the infrastructure, Marikina City understood the value of pursuing the biking program anchored on policy. Hence, the City Council enacted Ordinance No. 117 (2001) creating the Bikeways Office within the City Government.

<sup>3</sup> Information on http://www.youbike.com.tw/home.php

<sup>1</sup> Ralph Christian L. Mon, an Architect and a graduate of Bachelor of Science in Architecture from the University of Santo Tomas in 2010. He is currently taking up Master of Tropical Landscape Architecture from the University of the Philippines.

<sup>&</sup>lt;sup>2</sup> Zenaida C. Galingan, an associate professor at the University of the Philippines Diliman College of Architecture and currently the Graduate and Undergraduate Program Director for Landscape Architecture in the college.

The YouBike system was launched in 2009 with a modest 11 stations and 500 bikes. Now it has 214 stations with 7,000 bicycles, strategically placed next to MRT stations, bus stops and tourist attractions. To date, the bike-share scheme has surpassed the 40-million rental mark, logs an average of 52,000 trips a day with a turnover rate of 8.06 trips per bicycle. The city's bike lane network totals 498.38km, including bike paths, dual-use sidewalks and river bikeways. Downtown Taipei boasts a 58.93km-net work of cycling lanes.

The success of YouBike system in Taipei has caught the eye of other cities in Taiwan. New Taipei and Taichung as well as Changhua County, have followed suit and implement the system. The system has also been approached in major cities such as Toronto in Canada. The following are the reasons of the YouBike systems success:

Bike lane guality - lane surface are properly maintained, there are minimal roadside obstacles and gradient are not steep (which are good for beginners).

- Bike infrastructures are integrated in the sidewalks.
- Consistency and identification of bike lanes and related signs.
- Proper night lighting facility.
- Urban climate

Social climate and culture (transportation practices, minimal bike theft rate and safety awareness).

- Government support of the whole bike system.
- Quality of public transit service (transfer convenience and rate preference).
- Bicycle design and easiness of the system.

In Copenhagen, the area around the Fisketorvet Shopping Center was characterized by a problem of conflicting interests from cyclists and pedestrians. The solution was creating an elevated cycle path, Cykelslangen or 'The Bicycle Snake'. The orange cycle lane is four meters wide with two lanes and is 230 meters long and connects to the harbour bridge, ensuring the complete separation of cyclists and pedestrians.

The ground level is free for pedestrians use and on the upper level cyclists can pass quickly and easily through the area, while experiencing unique and exciting views and the elevated road allows pedestrians to use the entire wharf avoiding perilous situations. It is Copenhagen's approach in solving the bike lane problems which their only options consisted of pushing our bikes up and down steep stairs, or taking ridiculous detours, in a narrow space haphazardly shared with pedestrians.

This bridge will connect the Fisketorvet Shopping Centre, out over the harbour basin, and in between the blocks at Kalvebod Brygge, thus creating an elegant contrast to the rest of the area's massive concrete residential buildings. In order to give the cyclist both an aesthetic and a dynamic experience, The Bicycle Snake has been designed so that parts of it will extend out on to the water.

The new cycle bridge will meander six-seven meters above the surface of the water and in between Hotel Copenhagen Island, Aller Huset and Atrium above the pedestrian traffic on Vesterbrogade, all at first-floor level.<sup>4</sup>

In the Philippines, the MMDA Bike Sharing Program was introduced on Jan. 17, 2013. The program initially provided a one-kilometer bicycle lane along the northbound side of EDSA's sidewalks in Magallanes to Ayala Avenue in Makati City. Under this system, anyone who wants to ride an MMDA bike on the EDSA bike lane must first register with MMDA personnel at designated control areas along Magallanes, Pasay Road and Ayala Avenue. Pedestrians going to Magallanes from Ayala or vice-versa can use the bicycles upon presenting a valid identification card and filling out a record. Bikers will be issued a plastic card, which they will surrender when they leave the bike lane.

Last December 2015, MMDA relaunches its Bike-Sharing Program with 40 new mountain bikes distributed and were dispatched to areas with bike lanes in Ortigas area going to White Plains, Temple Drive, and Santolan near Camp Aguinaldo; Rajah Solayman in Kalaw, at the corner of Museong Pambata going to Quirino Grandstand in Manila; and Ayala going to Magallanes.

#### STATEMENT OF THE PROBLEM

Various cities in Metro Manila have adopted the sustainable approach in using bicycle as a mode of transportation. Despite numerous campaign awareness and initiative like the MMDA Bike Sharing Program, such programs still became unsuccessful due to the preference of the people to use the conventional way of transportation. Despite numerous bicycle awareness campaign and available bicycle lanes, why does the MMDA bike sharing program still unsuccessful? How can people be encouraged to use bicycles?

#### GOAL AND OBJECTIVES

The main goal of the study is to promote the use of bike sharing system and the use of sidewalks as means of connection and mode of transportation between residential, commercial and institutional areas.

It also aims to identify the different problems and reasons that discourage people from walking and using bike rental/sharing system thru survey and analysis of existing bike lane along EDSA-San tolan to EDSA-Ortigas. It will focus on the existing bike lane along EDSA-Santolan to EDSA-Ortigas. It will redevelop the existing bike lane and propose new ways to make biking safer and more enjoyable.

#### SCOPE AND LIMITATIONS

The study will focus only on the existing road and sidewalk conditions in bike lane along EDSA Santolan to EDSA Ortigas.

<sup>4</sup>http://www.dac.dk/en/dac-life/copenhagen-x-gallery/cases/the-bicycle-snake/

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Structural design and computation together with the plants to be used of the proposed elevated bike lane and redevelopment of the existing bike lane will not be discuss in the study.

The location of the bike terminals and conceptual design of bike terminal will be identified but the numbers of bicycle per terminals will not be discuss in the study.

#### SIGNIFICANCE OF THE STUDY

The study may serve as guide for LGUs in planning developments in the future that will incorporate sustainable and safe spaces for better mobility and ease of circulation.

#### SURVEY RESULT ANALYSIS

The survey was conducted for 20 days having respondents between the ages of 20-29 years old. Purpose of using the bike rental system like leisure, transportation from one location to another and transfer to other mode of transportation were included in the questionnaire Also, factors such as safety and security, price, easiness and distance of the route, weather condition, and design of streetscape were included as design preferences for the users to choose. The objective of the survey is to be able establish users' preference to be able to come up with the proper design considerations of the bike sharing system.

The result shows that 62% of respondents will not use the bike sharing system as their primary mode of transportation, but will use it for leisure purposes and to transfer to another mode of transportation like the MRT (Metro Rail Transit). The respondents expected use is within the range of 15-30 minutes only. The primary reason why these respondents will not use the bike sharing system as their primary mode of transportation is because of safety, distance of travel and the climate condition in the Philippines.

#### SITE INVENTORY AND ANALYIS



Fig. 1. Study Site

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1. Camp Aguinaldo	4
2. People Power Monument	5
3. Corinthian Gardens	6

The project site is a 2.8km bike lane along EDSA connecting MRT Santolan & Ortigas Station. (See Fig. 1) The project site is a 5.0 - 5.5 (widths varies per location) meter wide combined sidewalk for two way bike lanes and pedestrians. Some of the areas tends to become narrow due to existing bay-area and bus stops along EDSA which makes the sidewalk narrow for both pedestrians and cyclists, while some areas have an existing trees which obstructs the bike lane.



Fig. 2 & 3. Sidewalk width near Conneticut Area



Fig. 4 & 5. Obstructions along the sidewalk

PEDI-URBAN: Uplifting the Urban Spaces thru a Pedestrian Friendly and Bike Oriented Streetscape

- . EDSA Shrine . Robinsons Galleria 6. Ortigas Center
- 7. SM Megamall
- 8. POEA
- 9. La Salle Greenhills





#### THE SPACING OF STOPS AND STATIONS

The geometry of stop spacing works on every stop or station with a walking radius, the area from which most people would be willing to walk to a stop. In the most idealized world, which is where some planning happens, this radius defines a circle around each stop.

Different people have different comfortable walking distances, transit planners generally observe a 400m tolerable walking distance of people for a local-stop service, and about 1000m for a very fast, frequent and reliable rapid transit service.

Ideal stop spacing is as far apart as possible for the sake of speed. But of course people around the line have to be able to get to it. In particular, two areas of impact should be considered: (See Fig. 6)

The duplicate coverage area is the area that has more than one stop within walking distance. In most situations, on flat terrain, you need to be able to walk to one stop, but not two, so duplicate coverage is a waste. Moving stops further apart reduces the duplicate coverage area, which means that more unique people and areas are served by the stops.

The coverage gap is the area that is within walking distance of the line but not of a stop. As we move stops further apart, the coverage gap grows.



Fig. 6. Diamond Shaped Catchment<sup>5</sup>

In general, planners want to push stops as far apart as possible while still providing enough access, both for speed and, because the fewer stops, the more infrastructure we can afford to provide at each. But the limits of our ability to widen stop spacing is defined by the geometry outlined.

A local stop service with a walk distance of about 400m, can be exactly the same for any distance. A good example is by placing rapid transit stops, and thinking that the maximum walking distance is about 1000m, the stops can be located 1000m apart; thus ending up duplicating coverage area that's the same size as the coverage gap. In the given situation, designers can argue whether to push wider or narrower each stops.

#### THE BICYCLE AS A DESIGN VEHICLE

The operating space and physical dimensions of adult cyclists are things that should be considered in designing bike lanes. Clear space is required for the bicyclist to be able to operate; this is why the minimum operating width is greater than the 0.80m physical dimensions of the bicyclist. A minimum of 1.2 meters width is the minimum and 1.5 meters or more is the preferred operating width of an adult cyclist. The speed that various types of bicyclists can be expected to maintain under various conditions can also have influence over the design of facilities such as multi-use trails. A typical speed for an upright adult bicyclist is 24 km/h on a paved level surfacing, 16 km/h on crossing intersections, 48 km/h on downhill and 8-19km/h on uphill.

### **ON-STREET BICYCLE FACILITY DESIGN GUIDELINES**

A range of bicycle facilities can be applied in various contexts, providing varying levels of protection or separation from automobile traffic. This section summarizes the facility selection typology developed for the CRD through the Pedestrian and Cycling Master Plan (PCMP) process. (See Table 1)

<sup>&</sup>lt;sup>5</sup>Walker, J. (November 05, 2010) Basics: The Spacing of Stops and Stations [online], Available: http://humantransit.org/2010/11/san-francisco-a-rational-stop-spacing-plan.html

Facility Type	Max.Posted Speed	Travel Lane Width	Bikeway Width	Signs	Markings
Separated On-Stree	<u>et</u>		and the second	Autor adverse	
Cycle track	N/A	N/A	2.1m; 0.6m buffer	IB-23 "Bike Route"	Bicycle symbol + reserved lane diamond
Buffered bike lane	100 km	N/A	1.5-1.8m	RB-90 "Reserved Bicycle Lane"	Bicycle symbol + reserved lane diamond
Bicycle Lane/Shoul	MET.				
Bicycle lanes	100 km	N/A	1.8	RB-90 "Reserved Bicycle Lane"	Bicycle symbol + reserved lane diamond
Shoulder bikeways	freeways/ expressways	N/A	1.5	WC-47 "Share the Road" or IB- 23 "Bike Route" optional	Bicycle symbol + reserved lane diamond optional
Shared Roadway					
Marked wide curb lanes	60 km/h	4.0m or greater	N/A	WC-47 "Share the Road;" IB-23 "Bike Route" optional	Shared lane markings
Shared lanes	N/A	less than 4.0m	N/A	IB-23 "Bike Route" optional	N/A
Neighbourhood bikeways	50 km/h	generally less than 4.0m	N/A	WC-XX "Single File;"** 18-23 "Bike Route" optional	Shared lane markings

Table 1. Bicycle Facility Types and Summary Guidelines<sup>6</sup>

There are no 'hard and fast' rules for determining the most appropriate type of facility for a particular location; engineering judgement and planning skills are critical elements of this decision. However, consistent use of treatments and application of bikeway facilities allows users to anticipate whether they would feel comfortable riding on a particular facility, and plan their trips accordingly.

#### PARKING CLASSIFICATIONS

In general, bicycle parking falls into two categories: short-term (sometimes referred to as class II), and long-term (class I). Short-term parking serves people leaving bicycles for two hours or less. While racks for short-term parking should be designed, built and installed with security in mind, overall there is an emphasis on convenience and accessibility. Long-term parking is for bicycle parking needs of longer than two hours and for people who bike that may be willing to travel further to access it in exchange for greater security and protection from the elements. This Guide provides specification, location, and implementation details for short-and long-term bicycle parking. Figure 7 presents the different types of bicycle parking for each classification referenced in this document and Table 2 provides brief descriptions for the parking types described in this Guide.

	Bicycle Parking
S Bicy Sidewalk Bicycle Racks	Class II: hort-Term ycle Parking On-Street Bicycle Bicycle Corrals Lockers
Class	Parking Type
Class II: Short-Term Bicycle Parking	Sidewalk Bicycle Racks and Meter Bicycle R On-Street Bicycle Corrals
Class I: Long-Term Bicycle Parking	Bicycle Lockers
	Bicycle Cages / Rooms
	Bicycle Stations
	Monitored Bicycle Parking
	School Bicycle Parking

#### PEDI-URBAN: Uplifting the Urban Spaces thru a Pedestrian Friendly and Bike Oriented Streetscape



Fig. 7. Bicycle Parking Typology Diagram / Table 2. Bicycle Parking Types<sup>7</sup>

<sup>&</sup>lt;sup>6</sup>Capital Regional District Pedestrian and Cycling Master Plan Design Guidelines [online], Available: https://www.crd.bc.ca/docs/default-source/regional-planning-pdf/Pedestrian-Cycling-Master-Plan/pcmp\_design\_guidelines\_lowres.pdf

<sup>&</sup>lt;sup>7</sup>SFMTA: Bicycle Parking: Standards, Guidelines, Recommendations [online], Available: https://www.sfmta.com/sites/default/files/file\_attach/2017/1\_SFMTA\_bicycle\_parking\_guidelines-Updated-01-17-2017.pdf

#### SUMMARY

Given the factors that make the YouBike System and other bike sharing program successful, certain factors other than the design of the streetscape should be considered. Being on a tropical setting like the Philippines, the climate condition will be one of the factors to be considered in the design. The respondents shows concern not only on the security aspect of the bike lanes and distance of travel but also the climate condition in the Philippines. Therefore in designing specific bike stations additional design considerations to consider are the needs for locker and shower areas. This will entice users, specially the working class to use the bike sharing program as their alternate mode of transportation.

Lastly, having the same condition with Copenhagen where pedestrians and cyclists are having conflict due to the minimal width of the sidewalk, the author suggests that the existing 2.8km bike lane along EDSA can be provided with an elevated bike lane, retaining the existing trees and adding planting strip. This is to avoid obstruction from the existing road conditions and to separate pedestrians and cyclists. The height of the elevated bike lane will be around 5.40 - 5.50 meters depending on the depth of the beam, in order to have a vertical clearance of 5.00 meters along EDSA and a 4.00 meter setback from the property line will be provided as setback for the existing trees below. (See Figure 9)

#### **DESIGN RECOMMENDATIONS**

The design recommendations considers the 3 major factors that will affect the users in using a bike rental system.

Design of the streetscape - the design of the streetscape should incorporate landscape 1. elements and should be suitable in a tropical climate setting like the Philippines by providing more shade trees or covered walk.



Fig. 8. Proposed Bike Terminals located beside specific Bus Stops

Easiness and distance of the route - the proposed bicycle lane should have minimal slope and 2. doesn't have any obstructions. Also, bike terminals should be properly spaced and located to minimize the distance traveled by the users. According to NACTO the ideal spacing of bike stations is 1,000 feet or approximately 300 meters to make it convenient and easy and to ensure a 5mins walk between stations and to be to cater different types of neighborhood. (See Fig. 9)



Safety and Security - the bicycle lanes should be separated from the pedestrians and vehicles 3. to avoid accidents.



Fig. 10. Section of Proposed Elevated Bike lane

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# A study on pedestrianization and its surroundings' urban design- Schemes for creating new city centers focusing on transformation of transportation and public space -(Case Study in Europe)

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#### ABSTRACT

Nowadays due to the serious consequences of car-dependency and ignoring pedestrian needs, a consensus on the importance of walking and the necessity for planning for pedestrian's movement has been formed among urban designers, planners. In recent years, various European cities have developed their own transportation strategies towards sustainable cities, and the fundamental ideology is to improve public spaces by making former traffic areas into pedestrian-friendly districts to ease traffic jams and to solve the problem of pedestrians' inconveniences. This research is focusing on the projects concerning pedestrianization and trying to see the ripple effects on their surrounding areas and urban designs by verifying the spatial transformation and the characteristic of each city's public space and transportation strategy.

**Keywords:** Pedestrianization; Transportation Strategy; Public Space Network Strategy; Square

#### 1. INTRODUCTION

In Europe, the tide to exclude cars that had occupied the central city area and to promote the use of outdoor space started in the 1960s (Fig.1 Left) On the other hand, paying attention to projects that in recent years have transformed traffic space, we can see spatial readjustment not only in the central urban area but also in the surrounding areas of the city. (Fig.1 Right) It is conceivable that these spatial readjustments are contributing to extending the pedestrian space network while linking with the development of public transportation and the existing pedestrian space. Therefore, this paper focuses on recent pedestrianization projects (diverting and redistributing traffic space into pedestrian space) in Europe and aims to examine their backgrounds and schemes in order to clarify how those projects are being placed in the strategic development of the city.

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Fig.1 Left: Strøget, Copenhagen. Right: Rheinuferpromenade, Düsseldorf

### 2. RESEARCH FRAMEWORK

#### 2.1 Study on Recent Situation

Among the cities where strategic planning of multiple public spaces has been developed, we have selected several cities with projects that satisfy the following conditions.

- A) A project that transformed traffic space into car-free space
- B) A project completed within 10 years
- C) Public space involving the improvement of public transportation (buses and trams)



Fig.2 Different types of transformation around traffic space and their core projects

#### 2.2 Classification of Research Subject

Considering the development of pedestrian network, it is roughly able to divide into cities that developed pedestrian space radically and cities that gradually extended pedestrian space. It is speculated that the latter would be more appropriate to clarify the relationship between traffic space readjustments and strategic urban design. Among them, we selected 5 cities (Paris, Zurich, Copenhagen, Brussels, Vienna) that have characteristic public space and mobility strategy.



**3. CASE STUDIES** 

#### 3.1 Paris 3.1.1 Project outline (Place de la République)

Place de la République is a square in Paris, located on the border between the 3rd, 10th and 11th arrondissements. Paris mayor Bertrand Delanoë had made a renovation of the Place de la République one of his campaign promises in the 2008 campaign for re-election. The project involved the transformation of the square from a "glorified roundabout" into a pedestrian zone, with 70% of the square's 3.4 hectares and surroundings roads being reserved for pedestrians.



#### Table.1 Classification of Research Subject

s on urban structure	City	Research subject	
robabilitation	Oslo		
Tenabilitation	marseille		
agh existing urban areas	Bordeaux		
agir existing urban areas	Dijon		
	Zurich	*	
e square space	Paris	*	
ara nadastrian space	Copenhagen	*	
bie pedesiliali space	Ghent		
	Brussels	*	
eas divided by roads	Vienna	*	
	Dublin		

lic information eting		Completion
tudies for the mplementation	public information meeting on the progress	development work
0 December 2010	July 2011 October 2011	March 2013
+		

#### 3.1.2 Transportation Planning

The environment of the square is very dependent on traffic flows and especially public transport. In order to offer a clear and impeccable intermodality, a lane reserved for buses, taxis and cycles is set up on the northeast side, in connection with the Rue du Faubourg du Temple (a street from the northeast). Almost all of the bus stops are directly near the main subway, bicycle or taxi stations.



Fig.4 Left: Circulation (Before)(C)apur, Right: Aerial view (Middle: Before and Right: After)(C)TVK



Fig.5 Pedestrian area (Left; Before 12000m<sup>2</sup>(35%), Right: After 24000m<sup>2</sup>(70%))



Fig.6 Plan (Left; Before(C)apur, Right; After(C)TVK)

#### 3.1.3 Public Space Strategy

In 2001 the city of Paris launched a new transportation policy aimed at reducing car traffic by 20%. The city of Paris made the development of new trams, the operation of strategic bus network, the operation of regional minibus, the master plan of bicycle path, the improvement of accessibility for vulnerable road users. By 2020 it is planned to extend the bicycle path, reduce car traffic, make the entire central area zone 30, transform the part of the Seine riverbank and make 7 major squares pedestrian space, and install the exercise equipment on street.



Fig.7 Left: Future zone 30 plan towards 2020 and current pedestrian area (C)apur Right: New tram plan towards 2020(dotted lines show new tram ways) (C)EMTA

#### 3.2 Zurich

#### 3.2.1 Project outline (Sechseläutenplatz)

The opening of the S-Bahn (the regional train) in 1990 was a major step, which made the small station the second most important gateway into the city. Especially the parking spaces in front of the opera house, which interrupted the direct connection from the station to the lake, were criticized. (There was a theater with 165 parking spaces) In 1998, the city concluded a contract with the Bellevue-Stadelhofen association for the design, construction and operation of an underground parking garage.



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#### 3.2.2 Transportation Planning

In 2011, the city council decided on the inner city transport concept. The city center, with the exception of the main axes of the motorized traffic, is to be assigned as traffic zones (speed zones, meeting zones, pedestrian zones)(Fig.10). With the scope of the "historical traffic compromise (= getting rid of above-ground parking spaces in the Bellevue area), for example the parking spaces at the Münsterhof were replaced by subterranean buildings. Sechseläutenplatz extended to the opera house with the aim of "enhancing the inner city for pedestrians". It can be said that redesign of Sechseläutenplatz was a main project for parking plan and pedestrianization plan.



Fig.10 Left: Transportation plan (2011), Middle: Münsterhof (2017) Right: Parking plan (2011)

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#### 3.2.3 Public Space Strategy

The pedestrian zones of the old town are to be extended and the Zone 30 is to be supplemented by the outside guarters. The concept for speed and traffic regimes with public transport includes the existing concepts (Neighborhood centers and municipal roads on Zone 30) and supplements them with additional topics (coexistence in the street area, road noise reduction by speed reduction) to a total view over the whole urban area.



Fig.11 Left: New zone 30 plan (2015), Right: New traffic calming projects From top: Röschibachplatz (2016), Brupbacherplatz (2012), Hardplatz (tram stop, 2017)

#### 3.3 Copenhagen

#### 3.3.1 Project outline (Nørreport Station)

Nørreport Station is the busiest station in Denmark with roughly 250,000 people bustling through it daily. Nørreport Station is also a traffic hub for the city's public transport, combining regional trains, S-trains, and Metro lines, as well as a major bus terminal. The old Nørreport Station was worn down, the air quality was poor, and passengers had to cross the busy road (Øster Voldgade) to access the station. Therefore, a central element for the new Nørreport station has also been redirecting the traffic flow and limiting the traffic lanes to only one side of the station.



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#### 3.3.2 Transportation Planning

Since the station is located in the city center of Copenhagen, and it was not possible to provide alternative routes because of the large amount of traffic. The whole process was managed in four phases by dividing the site into two groups. The bus terminal was moved from east side to west side. This project resulted in the reduction of the amount of traffic on the Øster Voldgade (Bofre: 21500cars/ day, After:9900cars/day)





Fig.15 Aerial view (Left: Before, Right: After) (C)COBE

#### 3.3.3 Public Space Strategy

36% of all trips to work or educational institutions in Copenhagen are by bicycle. This high percentage of the modal share is a key element in the declared goal of making Copenhagen CO2-neutral by 2025. The goal is 3 lanes in each direction on 80% of the network (4 lanes in total on stretches where the cycle tracks are bi-directional). The map (Fig.16 Left) shows the examples of large-scale improvements that have been approved and other improvements between now and 2025 that have a high priority. On the other hand, in the city center there will be a new metro line in 2018. The pedestrian space is extending outwards according to the decreasing amount of car traffic and the extension of bicycle paths.



and New metro square (Kongens Nytorv), Lower Right: pedestrian connection plan (2009)

#### 3.4 Brussels

#### 3.4.1 Project outline (Boulevard Anspach)

Brussels opened a new pedestrian area in the city center in July 2015. The car-free zone is one of the largest in Europe and a welcome move to improve quality of life in one of the continent's most congested cities. Works to transform the infrastructure in the area, including an added 3000 m3 of green space, have begun in 2016. The total project has an estimated cost of €33 million.

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inst extension of the Traffic studies ovate and to extend the traffic flow mu underground parking for bike Mid 2018 2014 Spring 2015 29 June 2015 Jun &Oct 2015 August 2017 inst study of the tart of traffic plan and 5 traffic flow scen edestrian zone al of the electrical network a central beulevants for the pentago ind the Fig.17 Time series of the project

#### 3.4.2 Transportation Planning

Subways and tramways are riding as before the pedestrianization of the boulevard. Regarding the buses, the City of Brussels asked the STIB to adapt some bus lines for an easiest access to the center of Brussels, particularly for two zones: de Brouckère and Bourse.



Fig.18 Left: Traffic circulation(C)City of Brussels, Right: extension of the pedestrian zone (dark green area was extended in 2013) (C)City of Brussels



Fig.19 Boulevard Anspach (Left: Before, Middle: Summer 2017, Right: 2018-2019(C)City of Brussels)

3.4.3 Public Space Strategy

The pedestrian network has been spreading outwards as a result of the decrease of the traffic volume in the Pentagon. This extension must be in accordance with surrounding living districts. The city of Brussels is first looking at these local networks and developing a flexible methodology to support to local authorities in setting up local networks. (Fig.20 Lower Right)



contemplation), Lower Right: Approach to principle of local pedestrian networks (C)City of Brussels

#### 3.5 Vienna

#### 3.5.1 Project outline (Mariahilferstrasse)

Mariahilfer Strasse is Austria's most famous shopping mall and Since 1996 the passers-by-frequency has risen sharply in the street. After various tests and basic studies, the beginning of the transformation was announced in October 2012.



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Fig.20 Left: Potential pedestrian area in the Pentagon, Upper Right: Place Fernand Cocq (under

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#### 3.5.2 Transportation Planning

There are two types of pedestrian space in this long street. One is car-free space in the middle of the street and the other is shared space on both sides. The city of Vienna made an analytical approach regarding social and traffic aspect to make the potential of this site as much as possible.



Fig.23 Left: Traffic regulation, Upper Right: Traffic lane (before), Lower Right: Shared space(current)

#### 3.5.3 Public Space Strategy

The Vienna Urban Mobility Plan was adopted by the City Council as part of the Urban Development Plan STEP 2025 in December 2014. The target of STEP 2025 is "80:20", which means that the citizens of Vienna are to use public transport, cycle or walk to cover 80% of the trips they need to make. In the city center there are several projects that are extending the pedestrian area by using excessive traffic space (Schwedenplatz etc.). It is characteristic that several long shopping streets including Mariahil ferstrasse are connecting the city center and new urban development. Zone 30 area is also widely spread in the whole city and play streets (temporary pedestrian streets) are also effective to create calm environment isolated from busy regional roads.



Fig.24 Zone30+Urban development plan (Left)Spielstrasse (Upper right, Play Street for kids, (C)PlanSinn), Schwedenplatz (lower right)

#### 4. CONCLUSIONS

This research has showed that the transformation of the traffic space in recent years should be seen just not as an expansion of the pedestrian space, but rather as the starting point of the chain repercussion of public spaces, and the analysis of the scheme from the urban design point of view has revealed that it is variously realized in each city.

In Paris, Zurich, Brussels and Vienna they have published their own mobility plan towards next decades, and set up wider zone 30 in the whole city area. The central urban area is able to seen as a part of its strategy but eliminating more cars to widen the pedestrian friendly space and networks. In Copenhagen they haven't made a clear traffic zone plan (except for road class plan), however in accordance with new urban development in surrounding areas, they are extending bicycle paths year by year and that's bringing about pedestrianization at the same time.

This research also suggests that the administration is able to extend the pedestrian space by establishing the strategies and concrete images of the public space and by involving the public transportation and private urban development. The core of this process is the development of an effective improvement of public space linked with the existing urban structure so that the public space which functions as the new neighborhood or city center has been created by using methods according to the current situation. (such as traffic calming, underground installation and reallocation of parking, rearrangement of public transportation, etc.)

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## Urban sprawl or co-existence with nature: Lessons from Japanese urban-rural mixture

#### ABSTRACT

This paper aims to present a new vision of urbanism in urban sprawl areas by discussing the history and current measures of urban sprawl in Japanese cities. The first section explains the mechanism of urban sprawl in Japan, which is characterized by small-scale private land ownership. The second section addresses the benefits of the urban-rural mixture, a typical land use pattern of Japanese urban sprawl areas. The third section introduces current planning measures for sprawl areas in association with up-to-date amendments of the City Planning Act and relevant laws. The last section concludes the discussion by conceptualizing Japanese agrarian urbanism with reference to one that has been pro posed from the context of new urbanism.

Keywords: Urban Sprawl; Planning History; Citizen Participation; Agrarian Urbanism

#### 1. THE FORMATION OF JAPANESE URBAN SPRAWL

Japanese urban sprawl is defined as a phenomenon where small-scale developments, in particular, housing developments, appear in areas where urban infrastructure (e.g., roads, swage systems, etc.) is not yet fully or adequately developed. Urban sprawl is often regarded as a "failure" of urban planning because it causes disordered land use and makes redevelopment difficult. A mixture of small subdivisions and agricultural landscapes is typically seen in Japanese urban sprawl as peri-urban rural areas often become a target for urban expansion (Fig. 1).

In Japan, most instances of urban sprawl is formed through the influence of the new City Planning Act established in 1968. In the 1960s, an incredible number of rural migrants moved into cities. This caused a housing shortage and thus rapid housing development occurred prior to urban infrastructure development, resulting in severe urban sprawl problems. To tackle such a problem, the new City Planning Act introduced the "Area Division" system. Area Division is a zoning system that divides a municipality into two areas: the Urbanization Promotion Area (UPA) and the Urbanization Control Area (UCA) (Fig. 2). The UPA is defined as the area that should be urbanized within 10 years. Conversely, the UCA is the area that has been designated for rural conservation which, in principal, regulates urban development. In theory, urban sprawl is prevented as the entire UPA is urbanized in a planned manner and the surrounding UCA is protected as if it were a green belt. In reality, however, urban sprawl still exists despite the best policy intentions.

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One of the reasons for this is that too large an area is designated as an UPA (Sorensen 2002). In Japan, land owners have powerful authority as their property rights are protected by the constitution. Therefore, their intention is prioritized when designating an area as UPA and UCA. During the period that area division was applied, most landowners were farmers. On the one hand, they intended to continue agricultural production, but on the other hand, they wanted to make a profit by selling their land. Such farmers were reluctant to designate their land as UCA, as they did not want to miss out on the chance to sell their land due to strict regulations by the law. Consequently, farmers intended to designate their land as UPA even though there was no prospect of selling the land within 10 years, resulting in too large a designation of UPA than initially envisioned by the planners. Their land tends to be built up randomly, as farmers sell out their land when they see fit. This results in urban sprawl.

Meanwhile, there are farmers who are willing to continue agricultural production even when surrounding areas are developed and land prices increase. The Productive Green Land Act enacted in 1974 and amended in 1991 is the law that aims to reduce land taxes for such farmers. Once their land is registered as a productive green land area, their land is regarded as being for agricultural purposes only, thus land conversion is strictly prohibited for 30 years. Instead, land property taxes and property inheritance taxes are significantly reduced to enable the continuation of agricultural production. The Productive Green Land Act is a unique measure for protecting farmers in urban areas, yet there is controversy because it increases land price and causes disordered urban-rural mixtures.



Fig. 1 Example of Japanese urban sprawl (Kashiwa city, Chiba, Japan) Solid line shows a boundary of UPA and UCA Source: Geospatial Information Authority of Japan

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### 2. IS URBAN SPRAWL A FAILURE OR AN OPPORTUNITY?

Urban sprawl is regarded as a failure of urban planning as it appears to be far from the ideal situation. However, it is not possible to say that urban sprawl is always negative for people living in such areas. Two examples are explained below.

The first example is citizen participation in maintaining farmland. In urban sprawl areas, the number of farmers who rented their vegetable fields (allotment gardens) increased with the increasing number of urban residences. Such grassroots actions started to appear in the 1960s, a period where rapid urbanization occurred in the suburbs of Tokyo. At that time, renting farmland was considered legally ambiguous in terms of the Agricultural Land Act, as the law was originally designed to eliminate the landlord-tenant system. However, the government gradually changed their mind as allotment gardens became more popular. Allotment gardens were legally approved in 1975 as long as activities on the garden are for recreational purposes only. Subsequently, the Act on the Special Provision of the Farmland Act was enacted in 1989 as the first law aiming at the promotion of allotment gardens. Since then, the number of the gardens keep rising (Fig. 3).

Urban sprawl or co-existence with nature: Lessons from Japanese urban-rural mixture

Source: Ministry of Land, Infrastructure, Transport and Tourism

Current research states that growing vegetables in cities bring a wide range of benefits including access to healthy food, food affordability, youth development and education, land stewardship, and so forth. (Guitart et al. 2012). Farmland in urban sprawl areas can therefore bring such broad benefits to neighboring urban residents.

The second example is of the recreational use of agricultural woodland. Historically, woodlands in rural Japan were maintained by agricultural communities to obtain timber, firewood, organic fertilizer, mushrooms, and so forth. Japanese call such woodlands Satoyama Woodlands. Satoyama woodlands lost their economic value due to the widespread use of fossil fuels and chemical fertilizers after WWII. Later, Satoyama woodlands in suburbs became targets of urban sprawl. The situation changed, however, because it was widely known that Satoyama woodlands are of central importance for biodiversity conservation. Research demonstrated that the rich biodiversity in Satoyama woodlands can only be maintained if continuous human utilization (vegetation maintenance) is guaranteed (Takeuchi 2010). The first National Strategy for the Conservation and Sustainable Use of Biological Diversity in 1995 noted that the underuse of Satoyama woodlands is regarded as one of the biodiversity crises in Japan. In response, the remaining Satoyama woodlands in urban sprawl areas became a place of citizen-based ecological conservation campaigns. Currently, friends of Satoyama woodlands (volunteer groups) work actively to restore their maintenance. Their activities are multi-purpose, including biodiversity conservation, health maintenance, a building community, environmental education, and so forth (Terada et al. 2010). Most groups are composed of retirees over 65 years of age, and therefore Satoyama woodlands in urban sprawl areas can be a place for mitigating the problems of an aging urban Japan.

These two examples demonstrate that we certainly could not say that urban sprawl is a failure when considering the people who live there. Even open public spaces (e.g., parks and greenways) are not enough, private green areas (e.g., farmland and Satoyama woodlands) must also assume such roles. It is unrealistic for urban infrastructure to be fundamentally improved in urban sprawl areas, since the Japanese population has already started to decline since 2005 which leads less tax revenue. As a result, urban sprawl should not be regarded as a failure of urban planning, but should be regarded as an opportunity for building communities that are close to nature, in order to offer constructive views and ideas.



Fig. 3. Changes in the number of allotment gardens in Japan Source: Ministry of Agriculture, Forestry and Fisheries

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#### 3. THE CURRENT DIRECTION OF JAPANESE URBAN PLANNING

The main focus of Japanese urban planning has already turned from "stock building" to "stock management" (Murayama 2016). The ideas on urban sprawl areas have also become more management focused, which accepts the existing urban-rural mixture and intends to increase its value. In relation to this, the most up-to-date revision of the City Planning Act and relevant laws developed new measures in 2017.

#### 3.1 Garden Residential Zone

Japanese land use planning prepares 12 zones for guiding developments: 7 residential, 2 commercial, and 3 industrial zones. The revision of the City Planning Act in 2017 introduced one more residential zone named the Garden Residential Zone (GRZ) as the eight residential zone. The GRZ intends to protect existing farmland in residential districts. The development of facilities that support agriculture, such as farmers markets or organic restaurants, are promoted. This zone is epoch-making as it is the first zone that deals with the urban-rural mixture in the context of urban planning. There is no actual designation yet, but urban sprawl areas are expected to be an option for future designation (Fig. 4). In advance of the GRZ, the government enacted the Basic Law on the Promotion of Urban Agriculture in 2015, and subsequently drew up the Basic Plan on the Promotion of Urban Agriculture in 2016. Through these new laws and plans, farmland in urban areas are clearly defined as land that belong in cities.

#### 3.2 Citizen Greenery Recognition Program

The Citizen Greenery Recognition Program (CGRP) was developed in association with the amendment of the Urban Green Space Act of 2017. The CGRP promotes the maintenance of private green areas (e.g., Satoyama woodlands and vacant lots in residential districts) through private sector initiatives (e.g., companies, NGOs, and neighborhood associations) instead of land owners. Once a green area is registered by the CGRP based on a contract between the landowner and the private sector group, the land owner receives the benefit of property tax reductions as an incentive for registration. In advance of the CGRP, a similar program called "Kashi-niwa (Rental Garden)" was developed and has been operated since 2010 by Kashiwa City, a local municipality of the Tokyo Metropolitan Region. Through the Kashi-niwa program, 47 green spaces in the city are maintained by NGOs or neighborhood associations (Fig. 5). Their activities are subsided by Kashiwa city, which makes it easier for citizen-based organizations to participate in the program.

#### 3.3 Guided Allotment Garden by Private Initiative

In the 1990s, some innovative farmers in Tokyo started guided allotment gardens. Unlike conventional allotment gardens, the guided allotment is where farmers offer lectures and instruction to gardeners on the farm. Guided allotment gardens have become more popular as most urban residents do not have any prior farming experience. However, there are not many farmers who are able to operate such gardens as farmers are aging and usually do not have any experience in the service business. In re sponse to this, there are currently entrepreneurial ventures that operate guided allotment gardens under the entrustment of farmers. Over 150 gardens are operated throughout the nation by two leading enterprises (Fig. 6). The current productive green land act does not permit the renting out of registered farmland to another person, as land owners have the responsibility of maintaining the farmland. However, productive green land areas are exposed to the risk of canceled registrations, as most were registered in 1992, a year after the amendment, and the 30-year prohibition of conversion will expire in 2022. This may result in disordered small housing developments in urban sprawl areas. In order to manage this prospect, the government aims to amend the productive green land act to enable owners to rent out registered land to other persons, including farmers and private enterprises.



Fig. 4. An expected area of GRZ designation (Nerima ward, Tokyo, Japan) Source: Urban Agriculture Section, Nerima City

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Photo: Toru Terada



Fig. 6. Guided allotment garden by a private enterprise Photo: Toru Terada

Urban sprawl or co-existence with nature: Lessons from Japanese urban-rural mixture

Fig. 5. Maintained Satoyama woodland by Kashi-niwa program

#### 4. TOWARDS AGRARIAN URBANISM IN THE CONTEXT OF ASIAN COUNTRIES

As discussed, Japanese urban sprawl was once regarded as a failure of urban planning, but is currently being reevaluated as an opportunity for appropriate urban-rural mixtures (Yokohari and Khew 2017). Andres Duany, one of prophets of new urbanism, reveals his vision for the agricultural restoration of sprawled areas in American cities in his book, "Agrarian Urbanism" (Duany and DPZ 2011). The idea is that sprawled areas in US cities, newly developed suburbs characterized by low density and car-dependent communities, are revitalized by creating new agricultural fields by using unmanaged car parks or vacant land. On the other hand, Japanese agrarian urbanism envisions a renaissance of agricultural green areas that used to be maintained by agricultural communities, and still exist in urban sprawl areas. Japanese agrarian urbanism does not add a new agricultural layer, but makes apparent the former rural layer to the current urban fabric in a modern style (Fig. 7). This model may be used as a new model of urbanism in most Asian cities that have a history of the incorporation of rural areas in the process of urbanization.



Surviving Agricultural Productions (A potential for Agrarian Urbanism)

Λ

Current Urban Tokyo

Λ

Former Tokyo (Edo)

Fig. 7. An conceptual illustration of Japanese agrarian urbanism Source: Tokyo Metropolitan Government (upper), Google Earth (middle), Board Game of the Famous Places in Edo in One View (Edo meisho ichiran sugoroku) in 1859

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### Empowering urban communities through rooftop farming

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#### ABSTRACT

Over the last ten years, different community groups in high-rise, high-density cities around the world have spontaneously activated under-utilized grey roof spaces on buildings of different types, sizes, and heights, for use as rooftop farms. These ad hoc projects have had little technical or policy support but their success in fostering positive community engagement, adding value to buildings, and in generating a sense of stewardship for the built environment, has caught the attention of building owners and city planners.

Urban rooftop farms, offer similar environmental and sustainable building benefits to traditional green roofs systems, e.g. improved building thermal performance, reduced urban heat island effect, energy conservation, noise and sound insulation, improved air quality, increased urban biodiversity, and positive contribution to urban greening. In addition, they offer valuable new sites for social interaction, active recreation, food production and health, and education. They can contribute significantly to sustainable urban community life, especially amongst the older age groups.

This paper outlines the findings of the 'Edible Roof Initiative', a four-year research and knowledge exchange study at Hong Kong University that has sought to empower local community groups to establish and run their own rooftop farms and for the environmental and social potential of such farms to be realized across the city.

Through a systematic evaluation of all current rooftop farm projects in Hong Kong, building, environmental, and operational performance criteria for URFs were defined, and technical specifications and processes in their construction and management developed. Spatial analysis of citywide building, land use and community data allowed a combined area of some 600ha. of existing roof space that could be adapted for rooftop farming, which could accommodate some 20,000 farmers. The initiative is now campaigning for rooftop farming to be incorporated within urban land use planning and decision making processes, notably as allowable green building coverage within the existing Sustainable Building Design Guidelines.

Keywords: Urban; Rooftop; Farming; Productive; Healthy Lifestyle

#### 1. URBAN ROOFTOP FARMING

Impoverished environments, unhealthy lifestyles, and low levels of physical activity and community interaction are commonly seen as products of urban densification and spatial congestion in cities. Space to plant and grow becomes increasingly rare. In Hong Kong, less than 1.0% of the population has access to a private garden and, the small numbers of ground level community gardens and hobby farms are typically located at the edge of the city where regular daily access is not feasible for urban dwellers.

In some high density urban districts, communities have started to utilize building roof decks for productive purposes. Since 2008, more than 60 urban rooftop farms (URF) have been established on residential, commercial, industrial, and institutional buildings. Most are run by residential, corporate or educational community groups where participants are drawn from within the building or campus (restricted-access), or by community enterprises which rent roof space to the public (open-to-pubic). A few more farms are strictly private.

Greater spatial limitations and operational complexities distinguish URFs from ground level farms (Thomaier 2015). Participants are motivated by personal interest rather than production (da Silva 2016, Hou 2017), but working within very small planted areas to produce small quantities of wide variety. Specht et al. (2014) highlighted potential community benefits of URFs, including higher levels of active recreation, healthier urban life-styles, and greater social interaction amongst participants. Active stewardship of the urban landscape (Pryor 2015) and positive community engagement through place-making (Noori et al. 2016) have been noted.

URF's can been shown to have similar benefits to green roof installations, e.g. lower solar heat gain and better insulation (Cerón-Palma et al. 2012); improved energy conservation, thermal performance and sound insulation; reduced urban heat island effect (Kitaya et al. 2009); improved air quality (Tong et al 2015); and increased urban biodiversity and positive contribution to urban greening (Borysiak et al. 2016).

URFs have not yet been commercialized, but there is growing interest in the potential for large-sale food production on city rooftops (Donald, 2011). Commercial potential has been demonstrated in Singapore and researchers are now exploring the use of glasshouses (Sanyé-Mengual et al. 2015); hydroponic systems (Taylor et al. 2012); and vertical structures (Banerjee and Adenaeuer 2013), to increase production.

The positive contribution to the urban environment is also attracting the attention of city governments (Colding & Barthel 2013; Martin et al. 2014), although the potential for URFs at a city-scale has not yet been examined. Clear definitions and performance criteria for URFs have made it difficult for them to be formalized within urban land use planning and decision making processes.

The objective of this research study was to make a systematic evaluation of the potential for URFs within Hong Kong, quantifying both the total physical roof space that could be activated for farming, and the possible levels of public participation in such farms.

#### 2. EXISTING URBAN ROOF FARMS

Detailed surveys of all existing URFs within Hong Kong were conducted in 2016, recording building, environmental and community conditions under which they occur. The survey comprised a detailed physical inspection of the building, material condition of the roof and extent and nature of farm operations. Interviews were conducted with farm managers / owners and survey guestionnaires of farm participants.

These conditions were generalized and mapped against city-scale land use records (Lands Department) and building data (Building Department), to generate estimates of the number of buildings and total roof space that could be utilized for URF operations. Spatial analysis of buildings with suitable roof space against census data (Census & Statistics Department), combined with participation rates in existing farms with respect to catchment population, gave an estimate of number of participants that could be involved.

Private URFs and those in operation for less than two years were excluded. Of the remaining 48 farms, 6 (12.5%) were located on residential buildings (built between 1983-00), 11 (22.9%) on institutional buildings (1983-13), 18 (37.5%) on industrial Buildings (1970-03), and 13 (27.15%) being on commercial buildings (1978-13). There were 19 'Open' farms (ave. 42 farmers, total farm area 7,315m2) and 29 'Restricted' farms (ave. 22 farmers, total farm area 5,270m2).

Data collected to determine the environmental and building limits for URF operations, included: building type and age, farm location (rooftop / podium deck); rooftop height; means of access (by stairs or lift); roof size and farmed area; other roof uses (e.g. emergency refuge); structural capacity of the roof deck; parapet edge conditions; services / structures; roof drainage; water proofing; water supply; and sunlight / wind exposure. Examples of farms on industrial buildings are shown in Figs 1-3.



Fig 1. Hysan Place Rooftop Farm, Causeway Bay





Fig 3. Fun & Farm Rooftop Farm, Kwun Tong

Farm managers / owners were interviewed to understand the history of the farm; building and farm ownership; funding model and operational structure; number of participants and their origin (specific community group or the general public); planter type and typical crop species; soil material and estimated weight; and related activities (instruction sessions, crafts etc.). Managers / owners were further invited to share their experience of the operating limits of rooftop farming.

A guestionnaire, distributed through farm managers, generated information on participants' age, gender; employment status; motivation; frequency and timing of visits; time spent per visit; point of origin (home or work); distance travelled; and level of farming experience.

#### 3. POTENTIAL FOR URFS IN HONG KONG

An estimation of the potential for URF within Hong Kong was generated from (a) physical capacity i.e. the total roof area of all existing buildings capable of supporting URFs, and (b) participatory capacity i.e. applying rates of participation in existing farms (number of participants with respect to their catchment populations), at a city scale.

Hong Kong has some 41,600 buildings, comprising residential / composite buildings (80.8% of total building stock); institutional buildings, (6.8%); office/ commercial buildings (6.2%); industrial buildings (4.2%) and others (5.0%). An assessment of the number of buildings on which URFs would be possible was made based on limiting factors.

Roof decks require sufficient spare structural capacity to support the retro-fitting of a farm operation. Through evaluations of green roof constructions, it was determined that roofs that had been designed for emergency fire refuge (i.e. flat reinforced concrete constructions, to current building standards) were likely to have sufficient structural capacity to support a farm, plus they would have direct access and could be used safely. Buildings with pitched roofs, long span or lightweight structure roofs (e.g. sports halls) were not included. Buildings with sensitive rooftop features or property rights issues that would preclude public access, were not included.

Environmental conditions on the roof were not a limiting factor. Farm managers reported that growing conditions (sunlight, rain, shelter from winds, presence of insect pollinators) were favourable, due to the screening effects of parapet walls. As the highest existing URFs was at the 39/f level, a cut off building height of approximately +140m was adopted in the assessment. Minimum operable area required to sustain a community-based URF was estimated by farm managers at approx. 40m2 (with an equivalent planted area of 12.0m2). This effectively excluded all individual, low rise residential buildings.

Farmable roof area was calculated by deducting the space required for rooftop infrastructure (elevator housings, AC units, water tanks etc.) and operational requirements (access for inspection, emergency evacuation etc.), from the total building footprint. Building footprint and proportions of roof space taken up by infrastructure and operational requirements was estimated by building type and height, from building records and land survey plans, for all buildings within two sample urban sub-districts (one in a newer and one in an older urban area). These were cross-checked against aerial photographs.

All existing buildings within urban areas were assessed against these building and operational limits, to identify those that were suitable for rooftop farming, and to estimate the potential space that could be farmed, (Table 1). This should be considered as only an estimate: going forward, the research team will systematically identify and measure each building.

	,			1 5	0
Building type	Building height Low (0-4/floors) Medium (5-12/f) High rise (13-39/f)	No. useable buildings in HK ( <u>estimate</u> no.)	Typical building footprint (m²) ( <u>estimate</u> no.)	Percentage of building footprint farmable (typical %)	Estimated Farmable area (m²)
Residential	Low rise	0			0
	Medium rise	2,160	1,250	10%	270,000
	High rise	5,390	1,070	35%	2,018,555
Institutional	Low rise	320	1,820	65%	378,560
	Medium rise	1,220	1,480	50%	902,800
	High rise	80	920	45%	33,120
Commercial	Low rise	60	2,470	20%	29,640
	Medium rise	110	2,200	50%	121,000
	High rise	1,430	2,070	25%	740,025
Industrial	Low rise	540	1,510	75%	611,550
	Medium rise	930	1,360	65%	822,120
	High rise	60	940	45%	25,380
Total		12.300			5,952,750

The second measure looked at the potential demand for rooftop farming. Owners of open-topublic farms reported that the only limitation on their current operation was physical space. Farms were heavily oversubscribed and membership and extent of planter worked by individual participants had to be restricted. This is corroborated by the multiple year waiting lists within community gardens.

Farm managers identified participants as either 'regular farmers', typically visiting four or more times a week for a total of more than 3.5 hours, or 'occasional farmers' who visited only once or twice per week for less than 1.5 hours in total. There were many more occasional farmers then regular farmers in each farm, but farm operations were sustained by the regular farms.

In open-to-public farms, regular farmers rented 2.0-2.4m2 of planter space, but occasional farmers usually rented only some 0.5m2. In restricted farms, space was usually less constrained: regular farmers in these operations could manage areas up to 10.0m2, with occasional farmers managing 0.9-1.8m2 planted area. These figures are comparable to the standard plot size in ground level community gardens of 2.25m2, but small in comparison to plot sizes of 9.25m2 in weekend farms outside the city (Fedvmcs 2016).

Key demographic groups amongst farmers were young professionals (18-25), middle age workers (35-55), and the recently retired (55-75). The elderly (65-85) were widely viewed as a group likely to become much more involved in future (as the density of farms in the city increased), due to their greater free time and interest in health issues.

Table 1. Preliminary estimate of total farmable rooftop space in Hong Kong

The key outcome for most participants was social rather than productive. Farmers reported their key motivations as: learning new things; pleasure in growing things; social interaction; and opportunity for outdoor recreation.

In open-to-public farms, more than 64% of participants reported travelling less than 400m to the farm (<10 minutes) from their point of origin (home or work), with 96% having journeys of 800m (<20 minutes). 800m was taken to indicate the likely maximum distance a participant might be prepared to travel to get access to a farm. Census data for urban districts indicate the likely population within an 800m radius catchment would be between 31,000 and 54,000 people (C&SD 2016).

Participation rates in open-to-public farms, i.e. percentage of the population within the 800m, that participated in the farm, was between 0.19% and 0.32% (comparable to participation in government run community gardens). Restricted URFs drew participants from much smaller catchments (450-27,500 persons), and had participation rates of between 0.38% and 4.4%. Participants in this type of farm travelled shorter distances (commonly less than 200m) from point of origin.

#### 4. DISCUSSION & CONCLUSION

In Hong Kong, URFs have developed spontaneously in many urban districts over the last few years, without technical assistance or policy support, suggesting broad-based interest within the community. This is underpinned by questionnaire responses from farmers who cited: social engagement; healthy lifestyle; and opportunities to participate in active, nature based recreation; as key motivations for participation. URFs have been established on different building types, indicating potential both in terms of the range of roof spaces available for farms, and the communities that could support them.

The survey of current URF operations in Hong Kong, highlighted that the physical restrictions on the use of roof decks for farming were less than anticipated. Since 1970 most building roof decks in the city had been designed for emergency fire escape, giving them the structural capacity to support the weight of rooftop farms, as well as providing suitable safety features and means of access. Only buildings with lightweight roof construction did not have the physical capacity.

Aside from small low rise residences (mostly village houses), the roof decks of most buildings were large enough to support a community-based farm. Commercial buildings (of all heights) appear to offer the greatest total potential area for developing rooftop farms (ave. <2,000m2), although low or medium rise industrial buildings had the greatest percentage of useable area (65-75%) due to their having least amount of rooftop installations and operational requirements.

The preliminary estimation of 595ha of farmable roof space on buildings in urban Hong Kong needs detailed verification, but when compared with the total area of existing URFs measured in the survey (1.25ha), suggests considerable potential for expansion of rooftop farming activities, if current capacitors can be addressed.

The number of rooftop farmers engaged in the surveyed URFs (total, 1,435), was similar to the number engaged in the government's community farms, with both being restricted by available farms and farming space. Limiting plot sizes, has helped farm managers to maximize participation within the space available, but with rooftop plot sizes much smaller than those for weekend farms in Hong Kong, there could be strong demand for greater farm space just from current farmers.

Participants of open-to-public farms were drawn from the population immediately around the farm. Easy access to farms was a key consideration in farmers participation, with the majority travelling less than 10 minutes. Participation rate in open-to-public farms, based on the population within a notional 800m catchment of a typical urban district, was estimated to be around 0.25%. Applying this to urban population suggests that territory wide participation in rooftop farming could exceed 18,000 people. With participation rates up to 4.4% in restricted farms, it is possible that total participation could be much higher, particularly as more farms became available and travel distances were reduced, and if the initiative was supported by government and promoted centrally.

The study has indicated that there is already a strong demand and a sizeable potential for the development of URFs in Hong Kong. Although not yet a component of the Government's New Agricultural Policy (FHB 2016), urban rooftop farms offer a better prospect than traditional urban farms because of the potentially greater farmable area on the city's rooftops, and closer proximity to participant populations. The primary product of rooftop farming, however, was not food but social engagement. The motivations reported by of participants were very largely social and recreational, and these might be the most significant products of rooftop farming, and this aligns with policies promoting healthier lifestyles; community engagement; and aging in place.

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Farming in and on urban buildings: Present practice and specific novelties of Zero-Acreage

## Transforming Morbi: from harsh industrial inheritance to a livable urban fabric

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#### ABSTRACT

This paper will discuss the huge impact caused by the development of Industrial towns on the livability of people and the image-ability of the city. To develop a better outlook on the above premise, a case of an Industrial Town of Morbi is taken up, which has a large-scale ceramic base in India with 600 ceramic units concentrated in an area of 625 km2 and contributing 70% to India's gross ceramic production but also lending high quantity of air, land and water pollution. The argument takes support from understanding the physical setting of the city and the problems faced by the people residing in the city. And to be able to cater to such impediments of Industrial towns, principles of ECOLOGICAL URBANISM are applied, through which the character of industrial towns can possibly be enhanced. Which is important because apart from the physical setting the environmental quality of the town will also be elevated. This paper makes an honest attempt to define a new way to comprehend and redesign Industrial Towns, with the hope that people who are currently lost in the dusty milieu of the city, can wonder around the city without fearing for their wellbeing.

Keywords: Industrial Towns, Ceramic Industry, Air Pollution, Connected Open Space Systems, Ecological Urbanism, Morbi

#### 1. INTRODUCTION

It's the 21st century and industrialization is not only on its peak but beyond it. With China being the world's largest manufacturing country and also the world's largest emitter of CO2 (Lin & Sun, 2009) the air pollution problem within its cities is one of the top environmental concerns (Chan & Yao, 2007). Urban air pollution influences both the health of citizens and development of the cities. (He, Huo & Zang, 2002). In the urban design realm let's call it the livability and the imageability of cities. So, while industrialization has changed the landscape of many of these industrial cities, the deep structure of each of these cities is quite refined. Also, what is crucial to each of these cities is its people-city interaction which seems to be lost in the dusty milieu. Illustrating an example of Beijing (Fig.1) one can see that the cities environment has been disturbed by the toxic gases which is stealing away the right of people to roam around freely without the fear to their health. These toxic gases are released by a number of industries which are heavily reliant on coal burning as way of producing energy (A recent study by University of Leeds also states that "coal burning as origin to Northern China Apocalypse"). In a similar context, India is not far behind.

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A particular case of a city called Morbi, in the Gujarat state of India, is taken into consideration for the current research. Gujarat has 33 percent of the large-scale ceramic industries with 55% of the total capacity and 83% of the small-scale units of India with 97% of the total capacity of Small Scale Industries (SSI) units and 80% of the total sanitary units with 75% of the total capacity of ceramic units of India. (Status Report on Sanitary ware, Government of India, 2000). Out of 730 ceramic units of Guiarat, 43% units are in Raikot district. Morbi, in Raikot district accounts for 37.33%. This shows a very high degree of concentration of the ceramic units not only in the state, but also in the district. It is considered to be the most important center of modern organized ceramic industry contributing 70% to India's gross ceramic production and 5% of world's needs. One can only imagine the density of industries and the nature of air pollution that occurs in an area of 625 sq.mts. (Fig.2 &3)

Ceramic has been an ancient art that has grown with the human civilization and through the years the manufacturing has led to production of hazardous air. Air pollution abatement has been a constant concern for the ceramic industry over the last four decades. The multiplicity of materials involved, numbering in the hundreds of fluxes and refractories for the manufacture of many different types of glasses and ceramics, results in gaseous as well as particulate matter (Bozsin, 2012).

Specific in the case of Morbi, due to availability of charcoal at a cheaper rate in western India, refractory industries are using charcoal-derived producer gas for kiln and furnace heating, and approximately 126 charcoal-based producer gas units are in operation in Morbi as per a news reported by Times of India in 2013. There have been also many petitions filed by social activists and environmentalist to stop the running of the coal gasifiers as they are polluting the air with toxic gases harming the lives of people, also to stop the dumping of ceramic wastes haphazardly in low lying areas plus to provide for a green belt development around the industries.

Thus, understanding the above scenario that the city is experiencing, this research really is a call to arms to Landscape Designers, Environment Planners and Urban Designers to strategize the way we build human environments in industrial cities with grave environmental problems. And to create sustainable communities with balanced and harmonious built environment.



Fig. 1. Life in Beijing.

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Transforming Morbi: from harsh industrial inheritance to a livable urban fabric



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#### 2. INTRODUCTION TO SITE

#### 2.1 About the City

Morbi, a city and a municipality in Morbi district in the Indian state of Gujarat is about 230 km. from Ahmedabad and about 65 km. from Rajkot. It is situated on the Kathiawar peninsula. (Fig.4) The town of Morbi is situated on the river Machhu, and is 35 km from the sea. In 2006, the city's population was determined to be 250,000. Its chief products are cotton and grain. The city-state of Morbi and much of the building heritage and town planning is attributed to the administration of Sir Lakhdhiraji Waghji, who ruled from 1922 to 1948. Sir Waghji, like other contemporary rulers of Saurashtra, built roads and a railway network (of seventy miles), connecting Wadhwan with Morbi and the two small ports of Navlakhi and Vavania, for exporting the state's production of salt and cloth. During the British Raj era, Morbi State was one of several princely states governed by the Jadeja dynasty of Rajputs. It was classified as an 11-gun salute state. Morbi-Wankaner Urban Development Authority has come about in the year 2012 for the expansion of the Industrial Belt. (Fig.5)



Fig. 4. Location of Morbi



Fig. 5. Existing and Proposed Masterplan of Morbi-Wankaner Urban Development Authority.

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#### 2.2 History of the City

Morbi at that time was controlled by late Shri Lukhdhirji Bapu in 1925-26, a gentleman from Maharashtra who came with a perception to start a ceramic unit (for roofing tiles). This man was none other than the pioneer Shri Parshuram Canpule and with the help of the state started roofing tiles industry. After this the group never looked back and started stoneware pipe pickle unit, sanitary-ware crockery, glaze tiles and refectories located at Than, Wankaner, Morbi and Sihor and the brand name "Parshuram" has become a household name not only in India but also abroad now today's Morbi still remembers this great man and pays high honor to him for his handwork in up lifting of Morbi, Than & Wankaner. Without aim and his clear vision Morbi would have never become a big cluster of smash especially in roofing tiles, glazed tiles, sanitary ware & mosaic industries as Morbi develop the diversification side also remain and today. Ajanta & Samay are big names in clock industries today.

Today Morbi proudly owns approximately 150 mosaic industries/200 roofing tiles/100 glazed tiles/50 sanitary wares/6 ceramic cluster units/5 units/2 big clock industries/one big home appliance unit/big cosmetic unit and lots of ancillary units depending upon above Morbi annual turnover is reported to be around 800-900 crores and that in an area of 25 kms x 25 kms the above facts positively indicate the positive thinking of dashing entrepreneurs. There are around 600 ceramic manufacturing units with production worth 40,000 million rupees (4,000 core) annually. Thus, the ceramic and pottery industry of Gujarat has come a long way from its early Indus Valley Civilization to the most modem times by adopting advanced technologies, machineries methods processes, inventions, designs and colors at various stages of production and raw material handling including the marketing of the products.

#### 3. SITE STUDY

#### 3.1 Livability of the City

For analyzing the livability of the city several maps were generated that would help in developing the understanding of the cities livability. The Topography Map, Soil Map, Geomorphology Map were studied to understand the physiography of the city. Land and Road Classification Map and Socio-Economic Profile of the city was mapped to understand the type of land, population spread and the kind of population of the city. Also, maps were generated to demonstrate and identify Ground level concentration of SPM, Ecologically sensitive areas and areas with land pollution. All these maps help us identify the natural forces that govern the city, the identity of the city through its land and dense network of streets, and finally the effects of all of it on the city. Some of the inferences are:

#### 3.1.1 Land-Use

The left-hand side is primarily residential and the right-hand side is primarily industrial. In between the industries there is wastelands and in between the residential areas there is scrublands. As we can see there are barely any parks for public.

#### 3.1.2 Transport and Connectivity

The major road that cuts across the city and is the reason for major industrial development is the NH8A. The roads are divided into primary, secondary and tertiary. The usage pattern of each road on the different banks of the river is different. Mostly trucks and 4-wheelers are found in the right bank and 2-wheeler, rickshaws and cycle on the left-hand side of the bank.

#### 3.1.3 Socio-Economic Profile

Most of the richer class says south of the city and the lower income group are present in the center and north. In the industrial side the large-scale industries are on the north, whereas the small-scale industries are south. The Socio-economic profile has been mapped based on characteristic such as plot sizes, sizes of house, character of house and quality of roads, size of industries will help identify the kind and quality of intervention.

#### 3.1.4 Air Pollution Concern

The ground level SPM map shows that the area of most concern is situated in the North of the Industries. Apart from this, referring to the National Ambient Air Quality Standards (Central Pollution Control Board 2009) the requirement for PM10 (Particulate matter 10) is 60µg/m3 for industrial area. But according to an EIA (Environment Impact Assessment) report by M/S T.R. Associates for a proposed ceramic industry which is centrally located in the city, the PM10 count recorded by them is 75µg/m3, which is 15µg/m3 higher than the standard.

#### 3.1.5 Degrading Vegetation Concern

The vegetation of the region is Open-Scrub type, but within the empty pockets of residential neighborhoods, one would find degraded scrublands with almost no vegetation. Also, amongst the empty pockets within the industries are wastelands that have over the years been dumped by a lot of ceramic wastes, rendering the land to be unusable.

#### 3.1.6 Land Pollution Concern

Talking about land pollution, the land in and around the industrial areas is guarried for sand and clay, leaving them to become stagnant ponds of water post monsoon, that then breed mosquitoes. Also, the fired ceramic wastes are dumped haphazardly, which is harmful for the land as they are nonbiodegradable.



Fig. 6. Maps generated to understand the livability of Morbi.

#### 3.2 Image ability of the City

To be able to select a site for designing that encounters most of the problems that a ceramic city would face we would need to identify the problematic areas. To do so, above we have mapped the livability aspect. Overlaying the above maps with road typology, possible inactive or ecologically dead streets, with a matrix of diverse land uses have been selected. The path identified in green is an anticipated green trial one would take through the city. (Fig. 7) I have used my perception of the physical elements that have scope for ecological development along with the socioeconomic forces at play within each area of the city through the specific streetscapes in order to categorize them into street typologies which are:

- Industries: commercial areas: dumping areas
- Heritage: cross-over bridge: statues: riverside: industries
- Economic weaker section: railway station: scrublands
- Low income residence: heritage: market area: compact
- Medium income residence: farming areas
- High income residence: commercial areas: compact

One can conclude that the industrial areas have problems such as quarrying of soil, dumping of raw materials, expanse of underutilized spaces and lack of trees. Also, the area near the railway is sparse and underutilized. The residential area is very compact and to human scale with no footpath and lack of trees.



#### 4. DESIGN APPROACH

If we now create checklist of all that we have understood about the city and compare it with the major domains of urban planning theories i.e. social, economic, environmental and design, for a sustainable neighborhood we notice that Morbi lacks civic spaces, needs to restore its cultural heritage, have ecological protection, green spaces and green infrastructure. (Fig. 8)

Now the question arises as to how to answer these flaws in the design of the city of Morbi. Having been reading about importance of streets, I came across this very pivotal thought, which will now guide my research further.

"If we can develop and design streets so that they are wonderful, fulfilling places to be community-building places, attractive for all people – then we will have successfully designed about one-third of the city directly and will have had an immense impact on the rest." Allan Jacobs

Transforming Morbi: from harsh industrial inheritance to a livable urban fabric

#### Transforming Morbi: from harsh industrial inheritance to a livable urban fabric



Fig. 8. City Systems Chart for Morbi

Streets are often the most vital, yet underutilized public spaces in cities. 80% of the urban open space of Morbi is in the form of streets. It is rightly said that if we transform streets, we will transform 1/3rd of the city. As the physical aspects of a city greatly contribute to its perception by visitors and inhabitants alike. When moving through a city through its streets - be it on foot or in a car - elements of the urbanlandscape stand out in different ways to different people, and that is what creates a mental 'image 'in our minds that stays with us. For an inhabitant who knows the city, or a visitor who is new there, the perceived image is a combination of the physical qualities and the socio-economic indicators of those qualities. Kevin Lynch defines the elements which contribute to the image of any city – paths, edges, districts, landmarks, and nodes in which path is what we tread on. Also after understanding green streets, these streets which not only will enhance the imageability, but also the livability. For the current scenario of Morbi, the design should be able to attempt to cater to 2 typologies:

3.1 Industrial Street: Source of air pollution: Vision for Industrial area - Let not the industrial areas of the city be unexplored. Allow for the natural systems to coexist so as to keep the rest of the city resilient from pollution. (Fig. 9)



Fig. 9. Vision for Industrial Area

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3.2 Residential Street near Industrial Area: Impact of air pollution: Vision for Residential area -Expand the areas tree canopy and public gardens on public underutilised lands, degraded scrublands as well as private lands. As well as add interesting landscape features on public streets for an active visual experience. (Fig. 10)



Ultimately transforming Morbi from harsh industrial inheritance to a livable urban fabric

#### 5. CONCLUSION AND WAYFORWARD

It surprising to know that no kind of in-situ planning or design solution has been thought of for industrial cities. Especially as they reek of all kinds of pollution evils. One can only imagine the life of people who reside in such cities. In brief, Industrial cities redesign is important for the future of the city as whole. Not just for its economic contribution. But also, social, environmental and aesthetics

And in conclusion we have presented two distinct strategies for the city of Morbi, redesigning streets in industrial and residential areas and converting them into green streamers that run throughout the city, which not just help to raise the aesthetic but also ecologically benefit the city. The root of this solution has been derived from urban planning strategies involving connected open space systems. And to affirm this approach of retrieving an industrial city, one should reclaim its people and land with environment centric approaches.

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## Analysis on the Effects of Urbanization on the Water Quality of Two Water Systems in Quezon City, Philippines

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#### ABSTRACT

The city is an entity that produces, consumes, and disposes goods and services. In the course of metabolizing the different goods and processes, wastes are often produced, usually as a by-product or a symptom of inefficiency in the process. In many metropolitan countries, the conduit taken by emission and disposal of waste is carried by their water systems.

Quezon City is one of the cities that comprise Metropolitan Manila, a megacity and primate city in the Philippines. Two of the major river systems in the city are the Tullahan River and the Dili-man Creek, where many of the informal settler families (ISFs) have considered the banks of these rivers as their place of residence. ISFs living along the water systems are constantly ex-posed to various threats, notably from seasonal flooding and other socio-economic and political marginalization.

The environmental consequence of such inefficiency is the pollution of these rivers, primarily at-tributed to domestic waste. The local government unit (LGU) of Quezon City, along with its part-ner organizations, has implemented measures to address this issue through solid waste man-agement program and river clean-up campaigns. This paper aims to analyze the results of water quality monitoring of these rivers in relation to the different efforts to address the issue. Being multi-level in its approach, the paper will also analyze the strategies employed by the different sectors and how the Not-In-My-Backyard (NIMBY) attitude can shift into inclusive and participa-tory in terms of management.

Keywords: Solid waste; water channel; community participation; Urbanization

#### **1. INTRODUCTION**

Solid waste is an important global issue, intensified by the tremendous volume generated and the complex nature of the waste produced. Unmanaged waste impacts the quality of air, soil, water, and even the global climate. Seventeen years since the passage of Republic Act 9003 or the Ecological Solid Waste Management Act of 2000, the Philippines has been struggling to improve the management of solid waste despite the passage of several regulations and ordinances issues by both the national and local governments in support of the said law. Like any city with a large population, keeping the city clean is a tremendous responsibility.

In 2008, the Philippines' Supreme Court issued a continuing mandamus to clean the Manila Bay because of the trash that is continued to be thrown to the bay. In the said Supreme Court ruling, national government agencies such as the Department of Environment and Natural Resources (DENR) and 17 local government units (LGUs) in Metro Manila were ordered to clean up the city and its tributaries. In 2010, DENR launched the Adopt-an-Estero/River Program as its flagship program, which highlights the collaborative undertaking among the estero (water channel) com-munities, private sector, and the LGUs. The program is DENR's response to the mandamus, particularly estero and other waterways that drain to the Manila Bay. In effect, the program tar-gets to respond three important strategies: (1) adaptation to the changing climate, (2) proper solid waste management (SWM), and (3) ambient water quality protection, all of which involves the participation of private sector.

#### 2. METHODOLOGY

The paper examines the Adopt-an-Estero Annual Report, National Solid Waste 2008-2014, and the Water Quality Status Reports from 2011 to 2015. It focuses on two water bodies in Quezon City, of which one is adopted under the Adopt-an-Estero Waterbody Program and the other is being monitored by the DENR-EMB (Environmental Management Bureau) as part of its mandate under the Republic Act 9275 or the Philippine Clean Water Act of 2004. The study correlates the solid waste management activities conducted in the water bodies vis-a-vis the results of the wa-ter quality monitoring. It also lists some constraints and externalities (e.g. activities conducted by partners such as livelihood training programs and attitude of the community) that might have af-fected the results of the water quality monitoring that are related to the solid waste management activities and clean-ups conducted in the area by partners and DENR.

#### 3. RESULTS

Quezon City is one of the many cities that faces the issue of massive volume of generated waste. As a fast emerging industrial and business hub, the city produces 1,300 tonnes of trash everyday, or about 0.8 kilogram per person. Of the volume of waste generated and disposed, many of the wastes end up in bodies of water. In the process, water quality is affected by the disposal of waste in many bodies of water. The data presented are on two adopted bodies of wa-ter: Diliman Creek, adopted by Philippine Mine Safety and Environment Association (PMSEA) and Tullahan River adopted by Manila North Tollways and San Miguel Corporation.

#### 3.1 Diliman Creek

The Diliman Creek traverses 33 barangays (the basic local government unit in the Philippines) in Quezon City stretching seven kilometers. Among the activities conducted by PMSEA under the Adopt-an-Estero Waterbody Program are: (1) conduct of regular clean-up and donation of cleaning equipment; (2) installation of trash traps; (3) conduct of livelihood training for communities; and (4) support for water quality monitoring activities.

All the barangays along the Diliman Creek undertook clean-up every fourth Sunday of the month. During the initial clean-up, PMSEA distributed cleaning tools such as gloves, shovels, and other materials in all 33 barangays. During the first clean-up, a total of 100 participants were able to collect almost 50 sacks of wastes, including bulky wastes like beds and furniture. The collected trash were collected and disposed through the assistance of the Local Government of Quezon City.

Local leaders have agreed to stop dumping of garbage in the creek. They also pledged to participate in the clean-up. The clean-up also entailed dredging and de-silting of the water channel. There were also plans to introduce phyto-remediation through: (1) constructed wetlands, (2) the planting of bamboo and other plant species along the river banks, (3) rip-rapping or coco-matting and (4) the construction and greening of linear parks.

Sampling Station	Sampling Location Coordi		Dissolved Oxy- gen		Remarks	Biochemical Oxygen De- mand		Remarks
			2012	2016		2012	2016	
T.I.P.	Bridge along the Anonas Street, Quirino 3A, Quezon City (Bridge along Aurora Blvd. Boundary of Brgy. Quirino 3A, Silangan and Mangga in Quezon City, near TIP Cam- pus)	N: 14º 37' 45.62" E: 121º 03' 44.11"	0	0	No improve- ment	68	77	No improve- ment
Anonas	Bridge along the Aurora Blvd., Mangga, Quezon City (Bridge along Anonas Road, Boundary of Brgy. Quirino 3A and Project 2 in Quezon City)	N: 14º 37' 39.17" E: 121º 03' 45.28"	0	0	No improve- ment	75	77	No improve- ment
Nepa Q- Mart	Bridge along EDSA, Cubao, Quezon City (Bridge near Nepa-Q-Mart, EDSA, Boundary of Brgy. Kamuning, Pinagkaisahan, E. Rodriguez, and West Kamias in Quezon City)	N: 14º 37' 42.08" E: 121º 02' 49.75"	0	0	No improve- ment	70	76	No improve- ment
T. Morato	Lagarian Bridge along Tomas Morato, Quezon City (Bridge along Tomas Morato Avenue, Boundary of Brgy. Obrero and Kristong Hari in Quezon City)	N: 14º 37' 33.81" E: 121º 01' 59.91"	0	0	No improve- ment	76	75	Improved

Based on the water quality monitoring data, it was evident that there is no significant change in the dissolved oxygen (DO) and biochemical oxygen demand (BOD), which are two essential pa-rameters being monitored to indicate that a waterbody is in its good condition.

#### 3.2 Tullahan River

Tullahan River is one of the major rivers in Metro Manila. It has a toal length of 15 kilometers. In 2010, the Manila North Tollways (MNTC) adopted a stretch of Tullahan River. Then in 2013, San Miguel Corporation (SMC) also adopted a portion of the river. Below are the details of the length adopted by MNTC and San Miguel Corporation.

#### Table 1: Water Quality Monitoring Result of Diliman Creek

Name of Water-body	Location	Coordinates	Length of Whole Stretch	Donor Partners
Portion of Tullahan River	Valenzuela & Ma- labon City	Upstream: N: 14° 40' 14.66"/ E: 120° 58' 55.21" Downstream: N: 14° 40' 24.89"/ E: 120° 57' 47.51"	2,700 meters	San Miguel Founda- tion, Inc.
Tullahan River	Quezon City & Valenzuela City	Same as above	1,000 meters	Manila North Toll- ways Corporation (MNTC)

Table 2: Name of Adopted Creek and its coordinates.

Both MNTC and SMC conducted the same activities like what PMSEA did in both adopted creeks under the Memorandum of Agreement (MOA) for the Adopt-an-Estero Waterbody Program. In addition, MNTC established the Tullahan Patrol, a community-based organization composed of kids that help the barangay clean the river. They have also established a strong alliance with the Barangay Captain (local administrative leader) of two barangays and the Office of Congressman Kit Belmonte. Because of these alliance with the Office of Congressman Kit Belmonte and the creation of a Tullahan Patrol, MNTC was able to involved the children with activities for kids along the estero, in which they were able to learn the importance of caring for the river where they live through regular eco-camps.

Like the Diliman Creek, a regular clean up was conducted every fourth Sunday of the month in Tullahan River. Since the banks of Tullahan is long, a total of 50 sacks or almost 2,000 tons of wastes were collected from the river during the first clean-up. Wastes were collected and were also disposed through the assistance of the Local Government of Quezon City.

The MNTC and SMC also conducted rip-rapping along the river and introduced facilities like trash traps to prevent wastes from neighboring barangays to enter into the next barangay. Likewise regular water quality monitoring was conducted in two cycles - wet and dry season to monitor the state of water quality of the said river. Like the other rivers and waterbodies in Metro Manila, Tullahan River also failed to meet the DENR standard in both DO and BOD indicators.

The following are the water quality monitoring results for the portion of Tullahan adopted by MNTC and San Miguel Corporation.

Sampling Station	Location	Coordinates	Disso Oxy	Dissolved Oxygen Remarks		Biochemi- cal Oxy- gen De- mand		Remarks
			2012	2016		2012	2016	
Minda- nao Av- enue	Mindanao Avenue Bridge along Mindanao Avenue (Boundary of Brgy. Bagbag in Quezon City and Brgy. 164, Caloocan City)	N: 14º 41' 32.64" E: 121º 01' 26.55"	0	0	No im- provement	45	54	No im- provement
Maceda Bridge	Bridge along Road 1, Brgy. 164, Caloocan City	N: 14º 41' 25.53" E: 121º 01' 21.26"	0	0	No im- provement	43	49	No im- provement

#### Table 4: Water Quality Monitoring Results of Tullahan River Adopted by SMC

Sampling Station	Location	Coordinates	Dissolved Oxy- gen		Remarks	Biochemical Oxygen De- mand		Remarks
			2012	2016		2012	2016	
McArthur	McArthur Bridge along McArthur Highway (Boundary of Brgy. Potrero in Ma- labon City and Brgy. Marulas in Valenzuela City)	N: 14º 40' 14.66" E: 120º 58' 55.21"	0	0	No improve- ment	32	55	No improve- ment
M.H. Del Pi- lar	Tinajeros Bridge along M.H. Del Pilar (Boundary of Brgy. Maysilo and Sitio Gulayan in Valenzuela City	N: 14º 40' 24.89" E: 120º 57' 47.51"	0	0	No improve- ment	37	48	No improve- ment

#### 4. DISCUSSION

Since the launch of the Adopt-an-Estero/Waterbody Program in 2010, the program has gained extensive support from both the public and private sectors. The cooperation and overwhelming response of different industries, commercial establishments, the academe, other government agencies, local government units and communities on the program are the major factors that con-tributed to the attainment of the program's goals.

The private partners - city and barangay communities - continuously supported and provided the needed manpower during clean-up activities since the MOA was signed wherein the responsibili-ties of each partner are specified. However, in spite of the existence of MOA, there were still several issues and challenges confronted in the different adopted areas such as: (1) the decreas-ing number of participants from the community on the regular clean-up activities; (2) unimproved solid waste management practices of the residents; and (3) unimproved water quality.

#### Table 3: Water Quality Monitoring Results of Tullahan River Adopted by MNTC

The table below indicates the advantages and disadvantages of having public-private partner in the adopted waterbody in the two creeks being studied

Table 5: Summary of the Advantages and Disadvantages in Adopted Areas

Program	Advantages	Disadvantages			
Solid Waste Management	<ul> <li>Regular organized clean-ups were conducted because of the assistance of the partners. They have provided cleaning implements, food, t-shirt and transportation to the commu- nity during those clean-ups, thereby increas- ing the participation of the community in every clean-up conducted.</li> <li>Management and staff of private partners also participated in the clean-up, showing their commitment in rehabilitating the adopted creek/river.</li> <li>The local government unit and barangays of Quezon City were also supportive in the clean-up and provided people to haul the col- lected garbage in the area.</li> </ul>	<ul> <li>Clean-ups of the adopted area were only being initiated by the private partners and the DENR and not by the community living in the adopted area.</li> <li>People at the barangay were dependent on the private partners by seeking continued support during clean-ups like food and cleaning implements.</li> <li>It was also observed that there was no atti- tude change. People in the adopted area still throw garbage to the river and creek that were adopted when there was no scheduled clean-up.</li> </ul>			
Water Quality Monitoring	<ul> <li>Since the start of the clean-up, there had been physical changes observed in terms of water quality in the area.</li> <li>Residents reported that there had been fewer flooding, faster water flow and less odor com- ing from the river because of the frequent clean-ups conducted.</li> <li>Even-though both creek and river did not pass the DENR standard for water quality, it can be said that at least certain changes have been initiated in the community.</li> </ul>	<ul> <li>There is a need for DENR to always monitor these waterbodies. The absence of a monitoring body led to community's relapse in terms of its attitude of throwing its garbage to the water channel.</li> <li>In areas where there are no adopters, most of the waterbodies are not monitored. Private donors only assist DENR in monitoring adopted waterbodies.</li> <li>In some of the livelihood programs conducted in the adopted waterbody community where they learn recycling of pineapple peelings, some peelings were thrown to the river causing the BOD of the river to increase.</li> </ul>			
Others - Community participation - Local govern- ment assis- tance - Livelihood, etc.	<ul> <li>Community participation increased as the community participate in cleaning the river.</li> <li>The local governments and barangays were revitalized, and most of the women in the adopted communities were provided with livelihood training.</li> <li>Livelihoods centered in recycling of wastes like bags from recycled materials and composting of food wastes that can be used as fertilizers were initiated.</li> </ul>	<ul> <li>The program manifested the dole-out mentality of the community. People from the barangays started demanding for more livelihood seminars from the private partners.</li> <li>Local government and barangay people used these seminars as an opportunity to gather people especially during election period.</li> <li>When not elected, the support of the political leader for the project waned down. This attitude only signified that the commitment to revive the waterbody is politcally-motivated.</li> </ul>			

For esteros that have no adopter, it was noted that no regular clean-up activities were being con-ducted. The presence of the national government intervention is not felt. It was noted that com-munities in the area also wanted the presence of the national government intervention in their areas. However, due to constraints in human and financial resources, the national government ability to provide these services is limited.

Community leaders also said that they want concrete measures for their esteros. They also re-guested for specific interventions in their areas such as dredging and de-silting to reduce flooding in their area. In a seminar for community leaders conducted by DENR-EMB, most of the partici-pants and residents coming from communities near the creeks that were not adopted by private partners suggested the following:

- 1. throwing refuse in the waterways, and imposition of fines and penalties to violators.
- 2. "bantay-estero/bantay-ilog".
- 3. Inclusion in the LGUs' and barangays' work and financial plan the support for livelihood pro-ject.

#### 5. CONCLUSION

The people in the community require concrete measures such as Adopt-an-Estero, and strong leadership to propel them into action. Creating programs help the community organize and give them impetus to work faster and more cohesively since there is a guide for the community to follow and observe. Institutional linkages and partnership with private institution are also effective ways in an implementation of a project since most financial assistance usually comes from the private sector.

This study demonstrated that most people in the community still do not understand the value of environmental protection and management. This is reflected in the attitude of people on solid waste management. They still have the "NIMBY" or "not in my backyard" attitude wherein they do not want trash in their premises but the same people mindlessly dispose their waste outside of their "backyard". They continued throwing garbage in the bodies of water and, at the same time, complain of the government's inaction when they experience flooding and environmental disas-ters. It can be surmised that no amount of project or program will be the solution to environmental problems if most people in the community do not participate in being a solution.

Analysis on the Effects of Urbanization on the Water Quality of Two Water Systems in Quezon City, Philippines

Encourage the barangay council to pass a barangay ordinance regarding the prohibition of Creation of a "Team" composed of representatives from every barangay which will be called

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# Porous City Network: Building local resilience to climate disaster risk in Southeast Asia City

#### ABSTRACT

Porous City Network (PCN) works to improve urban resilience through meaning of landscape porosity. To live in concert with waterscape, like Bangkok, resilience and adaptation principles are critical as guidelines towards sustainable urbanism. PCN makes city porous by transforming underused hard surfaces into a system of productive public green spaces, and advocating maintaining threatened landscape infrastructure like agricultural land and canals. Our solutions call for permeable interventions like urban farms, green roofs, rain gardens, and permeable parking that provides porous space for water absorption. Our process enhances potential of local knowledge by looking to city's ecological past for lessons in living with water. We commit to co-creating design dialogue that shares with the public how increasing porosity can benefit the city and its ability to adapt. Design guidelines, education, and capacity building will ensure community preparedness for future changes and uncertainty.

Keywords: Porous City, Productive Public Green Space, Climate Change, Climate Vulnerable, Permeable Interventions

#### Porous City Network

"The landscape architecture as the social enterprise in building local resilience to climate disaster risk in Southeast Asia City".

Urban areas in Southeast Asia face critical resilience issues. Decades of rapid urbanization have increased water stresses in cities. Facing uncertainty, the effects of climate change threaten to submerge many cities within period of time. Bangkok and many cities in Southeast Asia are one of the most at-risk cities on Earth

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Fig.1. The aerial photo of the greater Bangkok and the Gulf of Thailand.

Climate change is one of the greatest challenges facing the world this century, affecting cities and their billions of residents globally. Many cities worldwide have already suffered its catastrophic effects. In Asia, many cities are targets for ongoing effects of climate change. In Southeast Asia in particular, our shared cultures based on agriculture and water living have made us vulnerable to unpredictable climate 's impacts, like heavy rain, flooding, rising sea levels, and water pollution. Extensive urban development furthers the effects of climate change by increasing temperatures through the urban heat island effect and preventing proper water drainage. Major cities lie at sea level and face especially severe consequences.

# **POROUS CITY**

PCN's objectives are to increase climate resilience in Bangkok through a built network of permeable public space projects, and expand knowledge of design solutions for climate resilience through research, outreach, and public education. This increased resilience will benefit the city as whole, but the main beneficiaries of our built work are residents of vulnerable comm nities. Climate-vulnerable communities tend to be economically vulnerable as well, located in areas that are especially prone to flooding and environmental hardship. PCN will focus our efforts on these vulnerable communities to add needed social space in addition to od-reduction strategies.



Bangkok, the city of three water sources: rain, sea (Gulf of Thailand) and mountains run off from northern Thailand. As for Bangkok, the city's already-precarious position just 5 feet above sea level has, combined with land subsidence. Tropical location of Thailand and the influence of seasonal monsoon rains and local topography make it prone to floods. In Thailand, there are three large dams that help regulate water flow in the central plains were unable to cope with the large amount of rainfall, but the management of pumping station could not help, it more difficult to accommo date the runoff of floodwaters from the north.

#### Fig.2. Bangkok, The city of water.

The Bangkok metropolitan region faces great climate resilience issues. According to the Intergovernmental Panel on Climate Change, by the end of this century, the mean sea level is predicted to rise by almost one meter. Bangkok is a city at sea level, threatened by rising seas, storm surge, and heavy seasonal and monsoon rain. The city is frequently inundated with severe flooding during the rainy season. Catastrophic flooding throughout central Thailand in 2011 showcased the most severe impact of climate change-related disaster in recent memory, affecting millions of residents, and costing billions of dollars in damage and loss. Studies suggest that as continued co2 gas emissions contribute to climate change and environmental impact, flooding like in 2011 will become more likely in the future.

Bangkok's geographic location and rapid urban development have made the city highly at-risk regarding climate change. Fifty years ago, the area that is now Bangkok was largely agricultural land which absorbed seasonal flooding and monsoon rain; today, this has been paved over by unchecked development. This extensive impervious surface has degraded urban ecology and increased stormwater pollution, urban heat island, and flooding (including catastrophic flooding in 2011). With a PCN-built network of porous green spaces around the city, areas with history of water management problems will be better able to absorb excess water from during Bangkok's rainy season, and offset rising temperatures in the surrounding area year-round. The greenspace network will be aligned with local needs both programmatic and ecological: PCN will use our ecological and landscape expertise to include ample permeable surface and appropriate planting, and work with communities to determine what type of greenspace is best for them, such as a permeable playground or shaded market space.



Fig.3. 100-years from the green city to grey city.

Porous City Network is a new social enterprise focused on increasing climate resilience through urban porosity. PCN tackles climate change in the vulnerable city of Bangkok, Thailand, which suffers from water stress issues, including severe flooding, and urban heat island effect. PCN initiates, designs, and implements projects that transform underused hardscaped surfaces to a system of permeable public green spaces, like urban farms, green roofs, rain gardens, and permeable parking, that provide space for water absorption, as well as adding much-needed public space to communities.

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One of the most significant topics climate change has raised is that climate change impact has

Additionally, PCN advocates maintaining threatened landscape infrastructure like agricultural land, canals, and ditch orchards, which help mitigate excess water. These interventions reflect climate challenges in vulnerable sites citywide. Urban porosity is critical to water management. Our placemaking team is comprised of landscape architects and environmental designers who commit to a co-creating design dialogue. We partner with communities to raise awareness of climate challenges and create site-specific design solutions. Design guidelines, education, and capacity building ensure increased urban resilience, ability to adapt, and community preparedness for future uncertainty. In con junction with built projects, PCN will run workshops to educate communities about the effects of climate change and how to best maintain their green spaces, such as sessions on urban farming and how to create small gardens at home. PCN will use social media to further amplify knowledge of climate change and urban resilience to the larger public, both in Bangkok and beyond. Finally, PCN proposes to expand our mission to the next generation by engaging young designers in Thailand: we will integrate our mission and process into an undergraduate landscape architecture studio course to demonstrate the importance of climate resilience and community engagement in the design of the built environment. made the environmental issue inevitably inseparable from social justice issue. This intersection of environmental and social consequences of climate change has accelerated in severity within our generation lifetime and directly contributes to injustice in most facets of human guality of life and security. As we witness, climate change is caused more by the developing countries who get the least affect of its. The most climate vulnerable people are those who are poor and having less power to make change.





Fig.4. Porous Solution, Future Solution

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PCN's objectives are to increase climate resilience in Bangkok and Southeast Asia Cities through a built network of permeable public space projects, and expand knowledge of design solutions for climate resilience through research, outreach, and public education. This increased resilience will benefit the city as whole, but the main beneficiaries of our built work are residents of vulnerable communities. Climate-vulnerable communities tend to be economically vulnerable as well, located in areas that are especially prone to flooding and environmental hardship. PCN will focus our efforts on these vulnerable communities to add needed social space in addition to water stress reduction strategies.



Fig.5. The green porous network of Bangkok.





#### Fig.6. The green porous solutions.

The idea Porous City Network is, inherently, a network of projects that together serve to increase the resilience of an urban area. The practice is replicable both within and across cities, particularly cities which face similar conditions to Bangkok, suffering from water vulnerability, urban heat island, and over-development. Part of PCN's practice is to assemble best practices and design guidelines to aid in applying solutions to other sites. Design guidelines will highlight both an overall design and implementation process, and technical guidelines like construction details for green roofs that are easy to understand. In addition to spreading PCN's process and practice, we aim to network with other cities and communities to share knowledge, ideas, and solutions. Climate change cannot be tackled by one city alone; we must work together.





Fig.7 The Lardpao canal community located on the flood way.





Fig.9 The community participatory on their future solutions.

PCN is based on a grassroots approach that results in built projects, whereas many climate-related organizations are top-down and policy-focused. PCN brings climate change education and tangible solutions to communities, working on an individual level to repair neighborhoods from the ground up. We are a placemaking team with design and technical expertise, and our network of porous solutions will have immediate impact on communities both ecologically and socially. Climate change is a large, complex issue and many people are not aware of its specific effect on themselves and their community, or how to increase their communities' resilience. PCN's built and educational work will equip communities with the tools and knowledge to create solutions for Thailand's urban environmental issues, and ensure that projects remain used and useful.

# THEME: GREEN Urban Forestry in India: The radical plan to enhance tree cover at national level

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#### ABSTRACT

Vanishing greenery is the primary reason behind the climate mess. If we enhance photosynthesis to the extent of its full potential, creating Oxy-zones; earth would be able to bring the carbon cycle into a state of balance. Let the sun come to earth via photosynthesis, so that there is no dearth of its benevolence, so that we prevail amidst ecological, affluence and can look forward to a happy and sustainable future.<sup>1</sup> Urban green spaces are integral components of urban ecosystems. In urban settings, these are one of those green infrastructures, which are more known for their non-priced benefits (like pollution control, energy conservation, leisure/ recreation, carbon sequestration, etc.) than priced benefits. Enhancement of green covermay affect long term hydrology too. To live in sustainable cities, an understanding needs to be developed that a tree stands as an integral part of the landscape. Lack of strategic efforts and scientific approach on improvement of urban tree cover<sup>2</sup> is resulting in making a tree stand as a green element rather than contributing to environmental benefits. We need a uniform Tree Act to achieve the national goal of 33% of forest and tree cover .My paper shall address the social science aspects of urban green. It shall outline the role that we can play in controlling and reversing ecological degradation, leaving a message to urban planners for spatial integration within the city planning.

Keywords: Urban Green Spaces: Green Infrastructures: Tree Cover: Tree Act

#### 1. INTRODUCTION

"Vasudev Kutumbkam!"- The whole world is one family originate! the fundamental principles of ecology - the interrelationship and interdependence of all life - are reflected in the ancient scriptural text, the Isopanishad. It says: "Each individual life-form must learn to enjoy its benefits by forming a part of the system in close relation with other species. Let not anyone species encroach upon the other's rights".<sup>3</sup> Indian civilization grew from the forest and learnt its principles of democracy and diversity from it. Coexistence with nature has been an integral part of Indian culture. In ancient India, environment was not an isolated entity, independent of mankind. Plants, animals and the whole Universe was an extended family to them; reason behind they worshipping trees, rivers, mountains, oceans, creatures and animals. Rawal.J.J (n.d). The concept of participatory forest management was also prevalent in ancient India as illustrated by the examples of village committees overseeing the maintenance of panchavatis (a cluster of five types of trees) in the ancient Indian forest texts or Aranyakas. Vedic-era traditions also affirm that every village will be intact only when certain categories of forests are fostered i.e mahavan (the natural forest), shrivan (the forest of prosperity) and tapovan (the forest of religion). Pal Sanchari (February 15, 2017).

The report on climate change "Turn down the Heat" suggests that in the next hundred years the world is likely to be warmer by more than 4 degrees Celsius (7.2 degrees Fahrenheit) unless human beings take action to reduce their impact on Mother Earth.<sup>4</sup> Maximum Temperatures recorded in some Indian cities are all in the range of 40-47 degrees. In coming years these cities will cross 50 degrees. Even fan or Air Conditioners will not defend us in summer. Experts and Scientific community have a mammoth challenge to stop temperature from rising and making the Country Cool. The visionary mystic and yogi Sadhguru, rightly proclaims that "our survival is under threat. There is an immediate need to work on a higher level of understanding, awareness and involvement with the environment in which we exist. We and the environment are not separate from each other. As we breathe, what we exhale, the trees are inhaling. What the trees exhale, we are inhaling. Only one-half of the respiratory equipment is in our chest. Another half is hanging up there on the tree. If we do not take up the other half, this half will not exist by itself. Sadhguru describes that today we are looking at ecological concerns as an obligation to fulfill which is not an obligation, it is our life. Somewhere we humans believe only we are life, and everything else is not life. This is a very unfortunate way of caring for other life around us. Our lives are not separate from each other; our life is an integrated, connected life". Sadhguru (2012)

<sup>4</sup> http://isha.sadhguru.org/mission/environmental-initiatives/a-tree-can-save-the-world/

<sup>3</sup> Rawal.J.J (n.d).

<sup>&</sup>lt;sup>1</sup> Singh Vir (June 18, 2017) https://www.speakingtree.in/epaper

<sup>&</sup>lt;sup>2</sup> http://naeb.nic.in/Reports/str\_33\_ftc.pdf

#### 2. URBAN FORESTRY

Konijnendijk has defined Urban forestry as, "the art, science and technology of managing trees and forest resources in and around urban community ecosystems for the physiological, sociological, economic, and aesthetic benefits trees provide society". Konijnendijk, C.C., Ricard, R.M., Kenney, A. and Randrup, T.B., 2006. As discussed in their paper on Urban forestry in India, Chaudhry, P. and Tewari, V.P describes that "by 2025, two third of the world's population is expected to live in Urban areas. The distance between city inhabitants and nature is increasing. Urban greenery is one of the ways to bridge this gap between people and nature. These are one of those green infrastructures, which are more known for their non-priced benefits (like pollution control, energy conservation, leisure/recreation, carbon sequestration, etc.) than priced benefits in urban settings, contributing to an improved quality of urban life in many ways". Chaudhry, P. and Tewari, V.P. (2011)

Based on population estimates in 2015 and a recent study in nature by The Climate Reality Project; it was estimated that Trees per person in Russia is 4461, China – 102, Canada – 8953 & United States- 716. The global average is found to be 422 but for India it is just 28.Chris Mooney, (sept 2, 2015). As per Tree Census 2012<sup>5</sup>, Tree cover in Urban India - Delhi is 20% of the geographical area, Bangalore Urban district is 6.85%, Municipality areas of Gujarat is 8.8%, Gandhinagar is 53.9 % but Ahmedabad is only 4.6% for the municipal areas were as National Forest Policy<sup>6</sup>, 1988 envisages an average forest and tree cover of 33% of the geographical areas for the whole of the country. 1-2/2004-FP (Jul 11, 2014)

The diminishing green cover has left Ahmedabad gasping for breath. Between 1990-2010, the city's built up area grew by 132% and the tree cover fell from 46% to 24%, which is dismally low and dangerous trend too. If this trend continues, by 2030 next generation will be left with just 3% of the existing tree population. TOI. Ahmedabad edition (July 5, 2017). In Ahmedabad one shares a tree with ten other individuals. Urban stresses and citizen's apathy to green canopies are eating into Ahmedabad's tree cover. They are in direct conflict with pedestrians and vehicles for breathing space. Underground utilities such as pipes and cables also intrude into the space of trees, impacting their overall address. TOI. Ahmedabad edition (July 6, 2017).

Since trees do not communicate in the way humans do, we humans, often take them to be passive. "Their credulity doesn't fit into the language of human 'Enlightenment' which leaves them unattended and uncared for". Roy. Sumana (July 2017). "People have a behavioral need for contact with trees in cities" as stated by Seymour. Humans have a basic desire for contact with vegetation. She further elaborates that, "Trees lends cities a dimension of sensory diversity, visual order and aesthetic pleasure that is lacking". Seymour M. Gold (Apr 07 2008).

#### 3. URBAN GREENING: LESSONS LEARNT

The Kingdom of Bhutan, as the most carbon negative country in the world, by aiming to remain carbon neutral for all time to come. The Prime Minister of Bhutan, Tshering Tobgay boasts of his country's achievements in a TED Talk. He promises about staying faithful to the core mission of Gross National Happiness, that is advancement with values. The Country emits around 1.5 million tons of carbon annually, while its forests absorb over 6 million tons. 72 percent of the country is under forest cover. The government ensures that in order to conserve the country's natural resources and to prevent degradation of the ecosystem, Constitution demands that "a minimum of 60% of Bhutan's total land shall remain under forest cover for all time". This makes Bhutan stand out as one the very few biodiversity hot spots in the world. Tshering Tobgay (March 11, 2016).

Japanese "forest bathing" is scientifically proven to improve our health. Japan launched a national health programme of 'Shinrin-yoku' in 1982; which meant spending more time around trees. No jogging, no workouts, just quiet contemplation near trees. It's not just about fresh air. Trees emit oils as protection from germs and insects. It is a gentle path to wellness accessible to almost everybody.<sup>7</sup>

Dr. AkiraMiyawaki<sup>8</sup> from Japan has advocated the value of natural forests and the urgent need to restore them since the year 1970. His afforestation methodology reconstitutes an "indigenous forests by indigenous trees", by producing a rich, dense and efficient protective natural forest. An Indian entrepreneur Mr. Shubhendu Sharma with his team Afforestt<sup>9</sup> has created 33 Forests in India and is into this mission of creating Urban Forests which grows 10 times faster than trees planted conventionally, giving a 100-year-old forest in just 10 years These forests are found to be 30 times denser, and 100 times more bio-diverse.

New Delhi, the capital city of India, has grown to be one of the greenest capitals in the world due to the emphasis to grow more trees and strict monitoring of tree cutting permissions. The green cover has increased from 30 sq kms to 300 sq kms in last decade. The per capita green space availability is around 21.43 sqm. There are nine city forests and two biodiversity parks in Delhi. The area of Forest & Tree cover per dweller is 17.68 sqm. The Ridge Land of total 7784 Ha has been notified as Reserved Forests. To have proper legal control, the Delhi Preservation of Tree Act, 1994 has provision for constitution of a Tree Authority for preservation of Tree. In lieu of the permission for removal of a tree, compensatory plantation of 10 plants of tree species are to be done and maintained for five years. To ensure this, the applicants are required to deposit a certain amount; 50% of which is refundable after five years, once the maintenances and growth is certified by the Tree Officer; failing which the same is carried out by the Forest Department. Tree Help Line is established to discourage the illicit / illegal felling of trees. Sinha Rama Shankar (2013).

<sup>&</sup>lt;sup>5</sup> http://cdn.narendramodi.in/wp-content/uploads/2012/07/Tree-Cover-in-Urban-area.pdf

<sup>&</sup>lt;sup>6</sup> http://naeb.nic.in/Reports/str\_33\_ftc.pdf<sup>3</sup> Rawal.J.J (n.d).

The Delhi government's urban forestry project in the wasteland of Deramandi, spanning across 358 hectares in the southeastern part of the southern Aravali ridge, focuses on rejuvenating grasslands and planting native varieties. The region had a flourishing flora and fauna till 1900 AD but increased urbanization and open cast quartzite mines resulted in encroachment and degradation. It has been chosen by the United Nations Framework Convention Climate Change (UNFCC) for clean development mechanism (CDM)<sup>10</sup>. TOI.Delhi edition (May 5, 2016).

Dharhara village in Bihar, has found a unique way to tackle declining sex ratios, global warming and climate change, altogether. The local community plants 10 fruit trees, to welcome the birth of a Girl child to build an asset base for her, which can eventually be utilized by the family to finance her education and future development. This green village today boasts of 20,000 fruit-bearing trees. Azim Saadia (August 30, 2012).

#### 4. MANAGEMENT OF URBAN GREEN

Forest Policy Division, Ministry of Environment and Forest & Climate change (MoEF&CC), Government of India<sup>11</sup> has prepared a draft on the issues of management of Urban Green and strategies to ensure sustainable level of green space which is being discussed here:

#### 4.1 ISSUES

The Town Planning Scheme has allotted only 5% for Urban Green. The Regulatory Authorities entrusted with protection of trees do not have a proactive role to play in City planning and green areas in urban landscapes. Absence of long term planning results in frequent changes in land use. As a result there is lack of integration of trees/ greens in the planned development process and trees are often planted as an afterthought. Were ever the infrastructure is expanding; there is a huge pressure on green spaces for competing the land uses. Land covered with trees is being viewed as loss of opportunity cost when compared to the land put to commercial and infrastructural uses. Trees are often viewed as obstruction to development and therefore become the first casualty in the process of development. Expenditure on greens is often seen as non-essential and elitist. The willingness to compensate for the loss of trees/ green cover is often lacking. Lack of proper selection of trees, concretization around trees and stressful growth conditions, impact proper growth and health of trees, leading to high cost of maintenance. Management of greens also requires trained manpower which is not available easily. There is a high floating population leading to urban poverty and homelessness. The open spaces reserved for trees are generally occupied by these people leading to a high pressure on urban greens.

#### <sup>10</sup> http://www.88energy.net/bluforest-inc-delhi-s-urban-forestry-project-carbon-credits-may-be-entitled-to-carbon-credits-307928.html,

#### 4.2 STRATEGIES TO ENSURE SUSTAINABLE LEVEL OF GREEN SPACE

Protection of existing greens should be given high priority. It is necessary to carry out tree census periodically. A minimum provision of 20% tree cover in new projects accommodating existing trees and greens needs to be made mandatory. Tree management is a specialized skill which needs professional approach and training. Use of tall saplings and round the clock protection to ensure the mortality should be encouraged. For safety and providing conducive growth environment for trees in city environment, concreting, hard surfacing should not be done around trees. Consistent emphasis to grow more trees and tree cutting permissions needs to be strictly monitored. In case of trees felling, appropriate provisions for land for compensatory plantation needs to be in built in the project design. Explore the possibility of utilization of semi processed raw water & traditional rain water harvesting techniques for irrigation.Utilize the surplus lands available with various institutions for tree plantations. Create a biodiversity park in each District Headquarters/ City to preserve local species and create public awareness. Trees of historical importance in cities need to be identified and preserved. Ceremonial Plantations & Tree tourism may be thought of as an activity for generating interest among local people and nature enthusiasts. Make tree plantation as a National drive. Local Governing body to monitor and make it mandatory for residents to plant minimum two trees in their house every monsoon. Plant trees that provide multiple benefits, particularly in house compounds for providing edible pods, flowers, fruits, leaves, etc.. Incentives for plantation may be thought off for citizens. Public Sector Undertakings (PSUs) in greening under their Corporate Social Responsibility (CSR) needs to be encouraged. The use of partnerships between governments, NGO's & MNC's for the development and maintenance of public services are viable development options, which offers benefits for all parties involved.

#### 5. CONCLUSIONS

The cities in 21st century have the freedom to bring nature into the city. We need to create sustainable urban areas by creating an ecology that embraces the aspects of urbanization along with nature; thus creating healthy spaces to live and work in. This aspect becomes very relevant in Indian cities that are going through great pressures of urbanization, pollution and overcrowding. Small efforts are required by each individual to bring a bigger change. Community participation and multidisciplinary approach needs to be encouraged. Effective strategies developed and implemented today will give returns in the long run.

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# The Newest Ecological Urban Park of Bangkok Chulalongkorn **Centennial Park**

#### ABSTRACT

Chulalongkorn Centennial Park is a critical piece of green infrastructure for the city of Bangkok, designed to mitigate detrimental ecological issues and add much-needed outdoor public space to the grey city. Chulalongkorn Centennial Park is designed to face future uncertainties of climate change. Bangkok is a climate-vulnerable city with little green space, and this park, which contains the largest green roof in Thailand, is an invaluable addition to the ecological landscape. The park addresses major environmental issues facing Bangkok as a rapidly-developed, hard-paved city: water management and the urban heat island effect. The design and environmental effects of the park reach beyond its boundaries into the surrounding neighborhood: a pedestrian- and bicycle-friendly road extends beyond the park in both directions, linking major roadways directly to the park's walkways, and water from neighboring areas is treated by the park's filtration system. Located on a large university campus in central Bangkok, close to residential, entertainment and major retail facilities, Centennial Park is a showcase for the ecological and social impacts of landscape architecture in dense urban areas.

Keywords: Urban Ecological Park, Green Infrastructure, Detention Area, Constructed Wetland, Green Roof.

#### THE NEWEST ECOLOGICAL URBAN PARK OF BANGKOK CHULALONGKORN CENTENARY PARK

"What will Bangkok be like in the 100 years from now? How can Green Public Space at the heart of Bangkok address the vision of the city of water and environmental challenges we are confronting? How can green city space help its citizens? How will Bangkok change climactically? As a winning competition team, Landprocess and N7A Architects, theses are the beginning ideas and questions we had asked before the beginning of the Chulalongkorn Centenary Park competition in the year 2012.

**SECTION 2** LANDSCAPE AND ECOLOGY

The Newest Ecological Urban Park of Bangkok Chulalongkorn Centennial Park

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#### The Newest Ecological Urban Park of Bangkok Chulalongkorn Centennial Park



Fig.1. The overall view how the urban context is spread out and its limited green porous area.

#### Bangkok: Grey City to Green City

The city of Bangkok has rapidly developed over the past half-century and now faces critical resilience issues due to threats of climate change. Agricultural land once absorbed seasonal flooding and cycles of monsoon rain; today, these have been paved over by urban development. Bangkok is not a porous city: there is minimal green space and excessive construction. In recent years, Bangkok has experienced increased flooding and rising temperatures, and struggles with water management. The lack of permeable surface in the urban landscape compounds these issues. The Bangkok metropolitan region faces great climate resilience issues. Bangkok is a city at sea level, threatened by rising seas, storm surge, and heavy seasonal and monsoon rain. The city is frequently inundated with severe flooding during the rainy season. The problem is slow and silent. Bangkok is sinking. Centennial Park is a critical piece of green infrastructure for the city of Bangkok, designed to mitigate detrimental ecological issues and add much-needed outdoor public space to the grey city. The establish of this park leads the direction away from finance and commerce and towards better quality of life and using big plots of land as productive public green space to contribute back to the city ecology and serve as a much-needed green oasis for Bangkokians.



Fig.2. The project includes the 11.5-acre park and the 1.3-km. green avenue connected two main roads of Bangkok. The park and the road serve as example of the green infrastructure to the city.





Fig.3. The root of Rain Tree, the symbol of Chulalongkorn University.



Fig.4. Extending the green and blue axis to the campus.

#### Park as Green Infrastructure

Centennial Park is located on a major university campus in central Bangkok. The Rama v, The King Chulalongkorn to found the university for the good of society, donated the campus land and now, the university has given some of the commercial part of campus that connects to the main academic core of campus to serve as a public park to the city and the Samyan new development.

Chulalongkorn Centennial Park celebrates the one hundred-year anniversary of Chulalongkorn University by looking forward. The design team elevated the competition brief from merely a park to an important piece of green infrastructure that critically address the environmental issues facing Bangkok. It not only honors the past but envisions a more resilient city in the coming century.

The 29-rai (11.5 acre) park is designed with many ecological functions that sustainably collect and treat water, decrease flood risks, reduce the urban heat island, and promote pedestrian and bicycle transportation. Centennial Park delivers sustainability back to Bangkok, and helps Chulalongkorn University to be an environmental leader in the city.

Continuing an important "green corridor" from the main academic campus to a commercial area on university-owned land, Centennial Park expands and improves Bangkok's green infrastructure. The park links the city to the campus through this commercial zone.



Fig.5. Park as architecture, the biggest incline green roof in Thailand design as the collector for rain harvesting.

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#### Park as Rain Tree

The symbol of Chulalongkorn University, the rain tree, is the conceptual basis of the park's ecology. We propose this park to act like the roof of the Rain tree, the symbol of Chula, with roots absorbing water unlike concrete roads, and creating a natural system to give back to the city. The meandering networks of tree roots overlay a rigid road network: the park reaches out into the city to reclaim some of Bangkok's historic waterscape urbanism. Centennial Park acts as tree roots for the city to absorb and control water, and as a tree canopy to provide shade and climatic relief to the neighborhood. The park-as-rain-tree helps to reclaim the landscape's natural ecology. Elements of the park reach into the neighborhood to continue water drainage patterns, plantings for water absorption and shade, and sustainable transit networks.



Fig.6. The water bike, the park element design for user 's participation in physical cleaning water in the retention area. The different of water level each day make the equipment changes its resistance.



Fig.7. The detention lawn

#### Park as Detention Area

The entirety of Centennial Park acts a detention area, absorbing water in a water-stressed city. The design concept inclines the entire park to create a container for water. At the park's highest point is Thailand's largest green roof. Program is inserted under this roof to create interior spaces: gallery, museum, and parking. Along the inclined plane runs the water treatment system and programmed outdoor spaces, culminating in a retention pond in the "container" created by depressing the plane below grade.

The park's main lawn acts a detention area to increase water infiltration to the ground, help runoff water drain easily to the retention areas, and allow for space for flooding and retention pond overflow. The precipitation return period takes into account five-, 50-, and 100-year floods, and the lawn is large enough to detain water from these floods.

Storage tanks throughout the park assure that water can be collected and distributed to the water treatment system for zero water discharge. Every drop of water that falls in the park will be utilized.

Adjacent to the main area of the park is a separate detention lawn to collect water in periods of heavy rainfall for use during drier months. This lawn can be aptly described by the Thai phrase "monkey cheek": storing something to "eat" later.

#### The Newest Ecological Urban Park of Bangkok Chulalongkorn Centennial Park



Fig.8. The constructed wetland as park recreation system

#### Park as Water Treatment System

There are three major components to Centennial Park's water treatment system: the green roof, the constructed wetlands, and the retention pond. Water runs from the green roof at highest point to the pond at the lowest.

The green roof is the catch basin for water. It is planted with native grasses and weeds for low maintenance: the plants can withstand Thailand's extremely hot and wet seasons, and need minimal irrigation. The roots of these plants are strong and help to absorb water. Runoff water is stored in rain tanks beneath the green roof, and overflow drains to the constructed wetlands. In the dry season, water from the storage tanks is used to irrigate the roof when necessary.

The constructed wetlands run downwards along the slope of park's inclined plane. Water running through the wetlands comes from green roof rain tank overflow, and from runoff from the main park lawn. The wetland steps down in elevation through a series of weirs and ponds, where water passes through a weir, cascades down to flow through a pond below filled with water plans, passes through another weir, and flows through another pond. Water is cleaned every time it goes through plants until reaching the retention pond.

The retention pond contains additional water plants for water treatment. The pond completes the system of water circulation for the park: in the dry season, water will be pumped up from the retention pond, and taken in from the neighborhood, to the top of the wetlands. This keeps the pond from becoming stagnant. Water from the retention pond is also used in the irrigation system for lower areas of the park. At each edge of the pond are special interactive design moments in the form of water treatment bikes, where visitors can ride stationary bikes to create movement and introduce more oxygen into the water. In addition ecological benefit, Centennial Park aims to inspire and educate the public.

The park collects water from the surrounding neighborhood to integrate into the park's filtration system for treatment. The wastewater we create within the park will be collected, cleaned and used not just in the park, but also to help the neighborhood with water as well. There will be zero water discharge, the park that stores run-off water.





Fig.10. The earth amphitheater, one of the eight outdoor classrooms.

#### Park as Outdoor Classroom

Recognizing that successful landscape design maintains maximum open space and spatial flexibility, the physical design of Centennial Park is an open area with activated edges. The park contains eight landscape "rooms" along two sides, adjacent to the wetlands lining the main lawn. Each space is based on a different material and contains distinct program, like an herb garden, amphitheater, meditation walk, and reading area. Each area provides a different opportunity for visitors to engage with the space. This edge condition forms a visual connection from the park to the neighborhood.

#### Park as Roadway

Centennial Park stretches into its larger urban context conceptually, ecologically, and physically. A roadway perpendicular to the park, connecting two major streets in Bangkok, originally ran across the center of the site. With the design proposal, this road became a natural extension of the park.

The design team convinced the university to make major adjustments to the road plan to prioritize pedestrians and environment: the road was diverted around the edge of the park with slower vehicular traffic, and reduced from four to two lanes in favor of widened pedestrian walkways and new bike lanes - both rare in Bangkok. The pedestrian paths connect directly to paths in Centennial Park for a seamless pedestrian experience. Chulalongkorn Centennial Road's 1.35-kilometer stretch prepares for future community expansion with bicycle and shuttle bus stops along road. Linear rain gardens, with a multitude of native plants, line the road to absorb water and further extend the park into the neighborhood.

## PHOTO REFERENCE

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# **Re-vitalizing People's Neglected Nature with Knowledge: Baan Yang Watershed Restoration Learning Park**

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#### ABSTRACT

On October 8, 2006, flashflood hit the northern part of Thailand, damaging 15 villages and their farmlands in Mae Ngon sub-district, including the First Royal Food factory (Doi-Kham) and the adjacent Baan Yang village. After the flood, Doi-Kham factory was rebuilt as a living museum to be the first knowledge center focusing on economic and social sustainability. During 2015-2016, Baan Yang village faced another extreme disaster, a severe drought, urging them to become aware of the consequence of watershed deforestation and water source degradation. Therefore, in order to promote ecological sustainability, the landscape planning of Baan Yang Watershed Restoration Learning Park (Baan Yang water(B) + forest(G) Learning Park) was developed to be a second knowledge center.

The learning park was designed to illustrate the interplay between water(B) and forest(G) as a dynamic process influencing on and influenced by people's activities. It was planned to be a life-size demonstration of the theory and practice on soil, water and forest re-habilitation and sustainable agricultural theory following King Bhumipol's philosophy. The upstream, mid-stream model of water-land-people composition are mapped onto each portion of land based on its spatial quality. The upstream model is designed to transform the abandoned farmland and degraded water-spring into study fields for locals to engage in revitalizing their neglected landscape, with the forest routing offers learners and tourists a chance to visit and understand the overall watershed system. The inner zone displays various types of forest and natural farming, the middle zone is the stream and forest museum called "Pa Srang Nam", with indoor and outdoor learning area. The outer zone serves local wisdom learning and smart farming.

Baan Yang B+G Learning Park aims to be a place for locals not only to learn, but also to develop their own knowledge on natural resource management and forest related occupations. In conclusion, while the first center (Fang Museum) focuses mainly on cultural and economic value, this second center emphasizes on the importance of co-existence between community and natural environment. Together, the two centers will equip Baan Yang community with the knowledge of dynamic balance between society, economic and nature. On extensive scale, this community can be a case study of locally driven watershed restoration for other communities, which altogether they could help Thailand's watershed situation and reduce the impact of climate change.

Keywords: Baan Yang Village; Learning Park; Sustainability; King Bhumipol's Philosophy; Watershed Restoration

1. INTRODUCTION

Thailand, a country once half-covered by forest, has been facing chronic deforestation. In 2016, forest area was only 31.6% of the total land, decreased from 273,600 sq.km. (171 million rais) in 1961 to 163,360 sq.km. (102.1 million rais). Despite the government policy to increase forest area to 40% in 10 vears (ISOC, 2015), by the end of 2016, the northern watershed forest was still 9.01% less than 1961 (Sankaman, 2016). Current attempt at reforestation cannot compete with the increasing food demand and urbanization. Agricultural area has expanded, forcing farmers to plant crops down to stream banks and up to mountainous areas, eliminating a crucial forest buffer zone for streams and destroying watershed forest. According to the Principle of Water Management module recommended by U.S. Environmental Protection Agency (EPA), to achieve a successful sustainable watershed management, one must engage both private and public partners, especially local farmland owners. In order to get them to participate, it requires a good source of knowledge, technical competence and holistic understanding of overall ecology, its value, and how it relates to their living quality. This paper presents a landscape planning for Baan Yang Watershed Restoration Learning Park (Baan Yang B+G Learning Park), which uses ecological design approach to transform the once destroyed forest and degraded water-spring into an outdoor classroom of water-based land use practices. It is designed for locals to learn, practice, and develop the knowledge that fits to their context.

#### 2. PROJECT BACKGROUND

#### 2.1 Baan Yang Sustainable Model

Mae Ngon sub-watershed is a part of Fang highland upstream watershed, covering 105 sg.km. (65,705 rais) of the northern parts of Chiang Mai. The geography of mountainous areas with deep dales forms the headwater recharge area of Mae Ngon stream. Baan Yang is a small village of Chinese Yunnan people who live along Mae Ngon Noi stream and rely on it for agriculture and living. In 2006, flash flood carrying big logs and massive mud-slide seriously damaged the village, its farmlands, and also the first Royal Food factory "Doi-Kham", which is in the village. In the reclamation master plan (Limpaiboon, 2008), the sustainable model of Baan Yang and the factory along with the idea of creating "Green Network" (Fig.1.) was then proposed to recover the economic and strengthen the village's value of local wisdom and environment.



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The model's core idea is adopted from Sufficiency Thinking concept (Chaipattana, 2017), which is to use knowledge and virtue as a strategy towards sustainability. The First Royal Factory at Fang Museum was then established as a first place of learning collaboration focusing on Sufficiency Economy and Cultural Tourism, which strengthens the linkage between society and economy. However, the linkage mechanism between society and natural environment was not yet visible.

#### 2.2 Environmental Issues and Potentials

In the past 10 years, Baan Yang community has been involved in many reforestation and checked weir programs. Nevertheless, most of the activities they involved are one-time-only and they hardly associate them with their living. In 2015, Thailand faced the worst drought in 30 years, in the north, the precipitation rate was 210 mm. less than average (Thaiwater, 2016), causing severe drought in most villages, including Baan Yang. This urged some villagers to become seriously aware of the consequence of watershed deforestation and water source degradation. They then began to see the importance of constructing collective knowledge on living with nature. Therefore, the Baan Yang B+G Learning Park was developed as a second place of learning collaboration.

#### 3. METHODOLOGY

The study method followed the landscape planning process from data gathering to design forming, which also involves major stakeholders in each stage. Ground survey and site environmental research led by the community was the first set of watershed data study. The on-site "walk and talk" with people in the village was a method to learn about site context and history from the community. GIS was used for spatial analysis and data mapping based on overlay technique to evaluate the site suitability for each use. Landform 3D model was used as a tool for communicating with locals to work on a scale fit to the site. Along the way, researchers and locals also got to learn from each other and exchange knowledge. Decision making and program setting came from both sides.

#### 4. APPROACH

#### 4.1 Man and Ecology

The creation of landscape planning of Baan Yang B+G Learning Park applied an ecological approach beyond sustainable design called Regenerative Design, focusing on restoring ecosystem's health and generating new resources for human use. Regenerative Design is a design perspective aims at catalyzing natural and human processes to improve environmental condition overtime as a progressive integral closed loop (Nancy Rottle, Ken Yocom, 2010). The design also aims to challenge McHarg's question in Design with Nature (1969) that whether or not we can use the formulation of water and land to decide between lands that should remain in their natural condition, lands that are limited to certain uses, and those lands that are most tolerant to development. In this planning, the application of hydrological, soil and green-biomass cycle was simplified and mapped onto each portion of land according to its spatial and physical quality. People usage program was then integrated to fit in to the hierarchy of natural sensitivity.

#### 4.2 Theories and Techniques

The reviews of some theories and techniques about water, forest and people (B+G+P) ecological interaction were done to find suitable models for this particular site. Amongst those, there are three sustainable farming models and two people's forest models, as explained below; Three sustainable farming models:

- 1) energy for local needs.'
- 2) on external factors.
- 3) cropping.

Two people's forest models:

- 1) source, wood materials, energy and other needs for living, at the same time improving soil quality.
- 2) natural forest in form and function, while still providing food, wood for building, energy and other needs for living

Permaculture comes from the word permanent and agriculture. It was explained by Bill Molli son and David Holmgren (1978) as a 'consciously designed landscapes which mimic the patterns and relationships found in nature, while yielding an abundance of food, fiber and

Biodynamic agriculture is a holistic way to create balance in farming ecosystem without relying

Poly-culture or integrated farming is a concept of multiple crops planting in the same space to avoid monoculture, using techniques such as intercropping, companion planting, and alley

Agro-forestry is multiple cropping under woody perennials in the same land management unit in a spatial arrangement or a temporal sequence imitating forest ecology. It provides more food

Multi-layer forestry is also agro-forestry in terms of many layers planting, but they are planted according to each plant's natural height, from understory to canopy perennial wood imitating

For Thais, there is one source of knowledge about agricultural restoration practice commonly referred to as "King's Theories" (ศาสตร์พระราชา) by the late King Bhumipol Adulyadej, which teaches us to create agricultural systems that benefit to ecosystem. The King's theories related to this learning center are: 3 forests 4 benefits (agro-forestry and multi-layer forestry), undisturbed forestry (preserved forest, wetland restoration), slope farming with vetiver planting (on-slope permaculture), New Theory farming (integrated farming) (Chaipattana). This confirmed that his methods of development are universal concepts yet locally applicable based on the principle of Thai culture. For in the case of Baan Yang, to explain B+G+P relationship through the King's methods is even more convincing, as they have been bound with the late King since the first settlement, both economically and spiritually. Therefore, these theories are planned to be demonstrated in different areas of the learning park.

#### 5. WATER/FOREST REVITALIZED BY PEOPLE

#### 5.1 The Site and Overall Planning of the Learning Park

The site is a part of Mae Ngon upstream watershed area, located behind Baan Yang Lao Jang, a restaurant famous for Yunnan hotpot. The reforestation and weir technique training organized by villagers has been taking place here over 4 years. The site covers 177.280 sg.m. with the geography of a small stream running through the valley with an old corn field on one slope and an abandoned lychee plantation on the other. The stream comes from one of the villages' important water-springs called "Dragon Water-eye", which was badly degraded because of over pumping during the 2015 drought. After reviewing the site's opportunities and constraints, the site has potential to display the model of upstream land management from a water-sensitive area to more tolerant one. The blue, green, land healthy relationship could be interpreted as a formulation of different shades of Blue (B) Green (G) and People (P) activities which are mapped onto each portion of land based on its spatial quality and the suitability with existing land use (fig. 3).



Fig.2. Site spatial guality, landform and stream network



#### Fig.3. Different shades of Blue(B) Green(G) and People(P) activities are mapped onto each portion of land to convey the usage composition suitable to upstream land management

The abandoned farmland was planned to be locals' study fields in revitalizing their once neglected landscape. The inner zone displays various types of forest and natural farming such as preserved forest, 3 forests 4 benefits, organic-rice field and riparian planting. The middle zone is the core of the learning center, composed of the stream and a water-forest museum called "Pa Srang Narm" (forest creates water) and multi-purpose areas for indoor/outdoor learning. The outer zone serves local wisdom learning, the practice of New Theory farming, and the promotion of farm-to-table Yunnan culinary and farm-to-market fresh vegetable and forest product.

#### 5.2 The Watershed Study Planning (Upstream Model)

The learning park at the inner zone demonstrates watershed restoration study, which illustrates the interplay between water and land as a dynamic process influencing on and influenced by people's activities. In respect of the natural process of water, land and forest as integral bio-mechanism, we can formulate some simple propositions of land-water relationship. The design replicates the closed loop of water cycle, from freshwater source discharged to wetland and stream, then diverted for ponds, fields, farms and other usage, to treated-water recharged back to ecosystem. Along the main watercourse, running water is slowed down by weir series, giving water time to penetrate stream floor. At the end, used water will be filtered and released into the soil or to the retention ponds, treated and reused for irrigation. The preserved forest, new planted forest and on-slope permaculture return water vapor to the atmosphere as well as absorb rainwater. Water then recharged back into soil and ground water system. Excess runoff will be filtered naturally by riparian planting zone before joining the watercourse again.



Fig.4. Blue/Green dynamic balance diagram



Baan Yang Blue + Green Learning Center.

Fig.7. Revitalized water and forest



Fig.6.Water Land and Forest profile

#### Water based design principles;

- 1) Preserve the natural flow of water
- 2) Avoid soil compaction around water-spring
- 3) Create multilayered planting to hold rainwater and avoid erosion
- 4) Slowdown ground reaching time of rainwater, reduce runoff quantity and speed
- 5) Preserve water absorbed forest floor
- 6) Create riparian planting and amphibious cropping as water filtration
- 7) Create both water retention and detention areas

The learning park is planned to be a life-size demonstration of the theories and the practices on natural resources conservation, stream and forest re-habilitation, and sustainable agricultural theories following the late King Bhumipol's philosophy. The design strives to replicate historical form in most areas, but some new land-techniques are also added in order to improve soil condition and demonstrates the water-management technique such as series of retention ponds, springs, and well for circulating water in the site and marsh land as detention area.

FOREST LEARNIN

Many different types of routing have been planned for different purposes. For watershed and forest study, there is 1,100 meters long bamboo boardwalk called Pa Srang Nam routing, offering learners and tourists a visit to each learning station and a chance to understand the overall system.

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Fig.9. Blue and Green Knowledge Learning Station, 1. Bamboo forest 2.Agro-forest 3.Waterfall and reforested watershed 4. Preserved sacred forest 5. Marsh 6. preserved water-eye 7. Flower plantation 8.Mixed-orchard 9.Amphibious farming 10.On-slope permaculture 11.Wetland/ orchard A. B+G museum B. Sharing gate C. Training hut D. Reflecting tea house

#### 6. OUTCOME

The Baan Yang B+G Learning Park, close to the village's entrance gate, focuses on living with nature, while the Fang Museum on the other end of the village focuses on clean technology and authentic culture. Together, they will tie the knowledge network physically and conceptually, completing the driven mechanism of Baan Yang Sustainable Model. The three unseparated factors, economic, social, and environment, will encompass each other with balance. The learning park can improve the ecological quality as well as strengthen the creative tourism aspect of the village.

1) The learning park is different from other learning centers in many ways, namely:

- a. from sustainable farming and forest product.
- b. enjoy the natural study.

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Rice field and hut

Low investment, because it is a living experimental lab which is adapted from present usage and is suitable to existing land potential. The manpower investment comes from training and doing, the materials come from natural resource, and the income comes

The property's size and components qualify for a life-size demonstration of the theories of Blue and Green combined in one place. The compact scale site also makes it possible to manage both learning and training in one day, and for day-trip tourists to

- The place is run by locals, so it is possible to develop further local-based activities C. such as water and forest quality and quantity monitoring, development of local natural by-products, and other "Living with Nature" approach programs, suitable for this particular community. It can also be a lesson for other communities that local scale watershed management is possible.
- Lastly, this learning center was designed to facilitate a complete loop of self-driven d. learning according to KOLP's Experiential Learning (2014) from knowing, engaging, reflecting, to sharing (from learners to teachers and vice versa). This integral loop of learning is essential in developing local's own wisdom to live harmoniously with nature.

Immediate outcome shows that forest starts to emerge and water resource becomes healthier. 2) In the long term, it can make the community overcome the impact of extreme drought and dreaded monsoon as well as economic risks from globalization.

#### 7. CONCLUSION

The landscape planning of Baan Yang B+G Learning Park aims to design a place for locals to develop their own wisdom on natural resource management, emphasizing on the importance of co-existence between human and natural environment. It hopes to be a starting point of people's interest to take care of their water and forest, and rely on themselves to revitalize their neglected nature. If successful, this community can be a case study of locally driven watershed restoration for others, which could altogether help Thailand's watershed situation and reduce the impact of climate change.

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# The landscape improvement of Huay Jo Creek waterfront areas for recreational uses

#### ABSTRACT

The waterfront areas of Huay Jo Creek, San Sai, Chiang Mai, are public spaces with the unique natural characteristics and a variety of land utilizations. These areas have potentials for conservation and rehabilitation of natural ecosystems as well as the area development for recreational uses. However, from a preliminary survey, they were classified as low-quality public spaces which conflicted with the growing demand for public open spaces due to the expansion of surrounding communities.

This article shows the suitable landscape design approaches to develop the selected waterfront areas along Huay Jo Creek for recreational uses and to solve the environmental degradation issues of the sites caused by lack of proper care and development. The research processes started by studying and collecting information on the various concerned factors. Research tools included surveys, questionnaires, and observations. The Overlay mapping analysis was carried out to find out the suitable sites for recreational activities with the minimal impact on the environment. Then, the landscape architectural designs were developed in details on four different Huay Jo Creek sites with different contexts and users. These could increase the utilization of the existing wilderness and abandoned areas, creating recreational land uses for communities that lead to sustainable coexistence of lives in the ecosystems.

Keywords: Landscape, Improvement, Waterfront, Recreation

#### **1. INTRODUCTION**

Huay Jo is a small natural creek that is approximately 9.7 kilometers in length. It flows through forests, communities, agricultural areas, educational institutions and commercial districts. It is located within Amphoe San Sai meandering through tambon Papai, Maejo Municipalities, and tambon Nong Han. These areas are the outskirts of Chiang Mai province. Currently, community areas have continuously expanded since the establishment of Maejo University. The number of natural areas and agricultural areas have decreased and been replaced with residential areas. The environment nearby the creek has degraded. These have affected the ecosystems and the life's quality of people in the surrounding communities.

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From the study, it is found that the area of tambon Paphai, Maejo Municipalities, and tambon Nongharn cover the overall area of approximately 198.116 square kilometers (19,811.60 hectares) Their population is 35,025. There are green areas for public services consisting of 2 neighborhood parks, a standard football field, three futsal fields and 21 multi-purpose sports fields, with the total areas of approximately 0.085-0.10 km<sup>2</sup>. (8.50-10 hectares). They cover about 0.43-0.05 percent of the total land areas or 2.43-2.86 sq. m. per person. (The standard defines that green areas for public services must be at least 10 percent of the overall areas or 4 sq. m. per person). It is considered to be a lot less than the required standard. For this reason, it is imperative to develop additional green spaces for public services.

Most of the waterfront landscape areas usually have diverse characteristics in physical and ecological features, and in the uses of space. These features support great site potentials development as recreational areas for communities' members. However, the Huay Jo creek waterfront areas are classified as low-quality public spaces. It is difficult of accesses. Most of the areas are abandoned and lack beneficial uses.

#### 2. OBJECTIVES

To study the various involved factors, along with the potentials and constraints for the landscape development of the Huay Jo creek waterfront landscape area, and to find the design solutions to create recreational spaces for a better quality of life and the sustainable ecosystems.

#### 3. RESEARCH TOOLS AND METHODOLOGY

The population in the study area was divided into two groups, consisting of the general public and the Maejo university's students and personnels. The Mixed sampling was used in the research including the Stratified Sampling and the accidental Sampling. Tools used in the research consisted of questionnaires, surveys, and observations.

All concerned data were collected including secondary data from documents and primary data from questionnaire and field surveys. All data were analyzed using appropriate analysis methods such as the overlay mapping analysis and the descriptive statistics.

Finally, all analyzed data were processed together to summarize the potential and constraint maps to develop Huay Jo creek waterfront landscape for recreational uses. Then demonstration areas were selected and designed following the concept guidelines.

#### 4. RESEARCH FINDINGS

#### 4.1 The users' requirements.

The data from the questionnaires were divided into two groups including those from the general public and the Maejo university's students and staffs to study their behaviors concerning the Huai Jo creek waterfront spaces and their attitudes toward the improvement of the waterfront landscape areas for recreations. The results are as the following.

General public's popular activities in the waterfront areas included planting crops, walking, and maintenance of the waterfront areas, such as mowing, etc. The popular activities of the student group included walking, relaxing and educational activities.

Both the general public and students had the opinions that the major issues included the rough landscape, the overgrown grass, the degraded and abandoned areas without any uses. In addition, communities' residents recognized the importance of the flooding issues in the rainy season. While the students concerned a safety issue.

For the future landscape development, both the general public and students gave priority to the improvement of the landscapes for shade and beautiful sceneries. People also commented that the areas should be developed as recreational spaces, following by agricultural areas. The students stated that the ecology of the waterfront areas should be restored. Moreover, they advised that the erosion problems of the creek's bank should be solved (table 1).

Table 1 the requirements for Huay Jo Creek waterfront area development

The requirements	Students	General public
1. agricultural areas of the community	3.75	3.59
<ol><li>recreational areas for the activities of people in the community such as fishing, exercising, walking</li></ol>	3.96	3.68
3. the restoration of waterfront ecology.	4.04	3.58
4. dredging the creek to solve a shallow water problem.	3.64	3.48
5. the improvement of household water treatment systems.	3.96	3.39
<ol><li>the improvement of the landscapes for shade and beautiful sceneries</li></ol>	4.27	3.78
7. solving the erosion issue of the creek's banks	4.04	3.24
8. solving the flooding issue in the rainy season.	4.03	3.38
<ol> <li>provide space for cultural and traditional activities of the community, such as Loy Krathong, etc.</li> </ol>	3.83	3.41
10. clearly determine the waterfront public spaces to prevent the area invasion.	3.98	3.52

#### 4.2 The site's suitability

The researchers have applied methods of the Overlay mapping (Ian Mcharg, 1969) to find potential areas that were suitable for recreation uses. From the evaluation of the factors affecting land uses, it could be concluded that the factors affected the potential of recreational land development including the existing land uses characteristics, plants, circulation systems, and accesses to the waterfront area. While, the factors that affected the potential uses for water quality and ecosystem restoration, including water supply and drainage, vegetation, and the existing land uses. After such conclusions, series of maps were prepared to show the values of those factors; then they were overlayed, to sum up of the scores. Finally, the site potentials for two types land uses were summarized as shown in Figure 1

#### 4.3 The Conceptual framework

Guidelines for the development of Huay Jo creek waterfront areas for recreation had been derived from the result of analysis and synthesis of the data. They emphasized on 1) the analysis of data from the questionnaire (topic 5.1) which reflected the needs of communities' members and 2) the result of the synthesis of the project area (topic 5.2) which concluded the potentials and constraints in each zone, and the possibility to develop the area. Finally, the design concepts of each area were created. The design concepts aimed to improve the waterfront landscape responding to the needs of the users. Factors promoting successful public spaces were taken into consideration. They consisted of the convenient access and linkage with the surrounding area, the promotion of social activities, the provision of activities that respond to the needs of the user, and the facilitation and promotion of the project's images. (Sakip et al., 2015).



#### 4.4 The Design Solutions

The researcher selected four demonstration sites with consideration of the different user groups' requirements in different site characteristics and potentials. They were as the following.

The area surrounding the reservoir has beautiful sceneries of the surrounding mountain forests. Recently, it is the place where people come to relax, biking, jogging, and fishing. However, the existing facilities are ruined, unattractive, and not sufficient. The main concepts were to improve the existing scenic pavilion and to add recreational facilities such as a sidewalk for jogging or walking, a few of fishing docks. The landscape surrounding the pavilion would be improving by planting more flowering trees.



Fig. 2 The waterfront landscape improvement plan of the area along Huay Jo Reservoir



Fig. 3 A fishing dock

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### 4.4.2 The landscape improvement of the area below Huay Jo Reservoir (Tan Khun Scout Camp) as a space for camping and ecological learning activities.

The conditions of Tan Khun Scout Camp were covered with an abundance of plants, such as Burma padauk, Jambolan Plum, Siamese Sal, Bungor, Mango Tree, etc. The structures of public service facilities within the scout camp are ruined temporary wood structures that have been built for more than 20 years.

The design approach aimed to add more youth training activities concerning conservation of natural resources other than the existing normal camp activities. For the reason that this area is situated among Ban Pong preservative forest. This would encourage young people's attentions and awareness toward the importance of natural resource conservation, especially the forestry. The area would provide a campground, a natural learning center, a multi-purpose building, a cafeteria and kitchen, a watchtower, a natural learning trail with interpretative signs, a treetop skywalk, and a suspension bridge for balance training.



Fig. 4 The landscape improvement plan of the downstream campground and recreation area



Fig. 5 A campground and a multi-purpose building



Fig. 6 A treetop skywalk

4.4.3 The landscape improvement of the Huay Jo creek waterfront areas at the dormitory zones and Suan Chaloemphrakiat Boonsri Health Park, within Maejo University.

At present, the conditions of the waterfront landscape along the Huay Jo Creek is overgrown, abandoned, with difficult of access. The existing facilities are ruined, unattractive, old, and outdated. Moreover, they don't meet the standards.

The main concepts to improve these areas were to define the recreational spaces with easy accesses and to develop beautiful sceneries landscapes that are well organized, modernized, practical, and easy to use. The areas that should be improved including, the waterfront sitting areas, the shops and restaurants outside the cafeteria, the signage, the pedestrian walkways and outdoor furniture within the health park. To prevent soil erosion along the waterfront banks, groundcovers such as brazil nuts should be planted. Low retaining walls should also be built along the creek.



Fig. 7 The waterfront landscape improvement plan within Maejo University



Fig. 8 the waterfront sitting areas

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#### 4.4.4 The Development of the waterfront recreational areas to promote local life, Ban Mae Jo.

The project area is an existing public waterfront area that is used for agriculture. It is partially abandoned wilderness area. The main concepts were to create multi-functional areas that could be used for passive recreation, while still preserve farmland for the community benefits. At the same time, educational activities would be added so that the area's users could learn about agriculture.

The area was divided into three parts consisting of a recreation area, an agricultural area for learning, and a commercial area for public services. The elements of the project include a restaurant, parking lots, organic products shops, waterfront pavilions, a multi-purpose green space, vegetable gardens, rice fields, etc.



Fig. 9 an agricultural area for learning

#### 5. CONCLUSION AND RECOMMENDATION

The study found that the area suitable for recreation development were mostly, those along the Huay Jo Creek and Huay Jo Reservoir within the distance of 50 meters, followed by some agricultural lands in Ban Tayao and Ban Maejo. Moreover, there were some suitable areas at students' dormitory zone in Maejo University. The researcher selected some areas to demonstrate the waterfront landscape design for recreational uses by considering the potential of the project areas and the requirement of the user groups. The designs aimed to find solutions to solve the sites' problem. The development goals were 1) to improve the waterfront landscape to be more attractive and shady, 2) to provide a recreational area and for activities of people in the communities, and 3) to improve water quality and waterfront ecological system for the habitats of various living things

Four areas along Huay Jo creek and reservoir with different characteristics were chosen as landscape design demonstration sites. The landscape design and improvement would respond to the potential and limitations of the sites and the needs of users. The designed recreational landscape would provide significant benefits to communities by increasing the quality of life and the environment, promoting health and relationships of people in the communities, and reducing pollution.

However, to make this study become practical, the government policies should be pushed forward regarding improving the guality of life in the community, focusing more on the recreational development of the area beside focusing only on the development of public health services system as in the present.

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# Eco-Revelatory Design: Uncovering Green-gold Agricultural Landscape of Barrio Santa Monica, Santa Rita, Pampanga, Philippines

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#### ABSTRACT

Brown B. Harkness introduced (ERD) Eco-revelatory Design as an ecological design concept in the field of landscape architecture. It works as a design strategy that attempts to enhance site ecosystems as well as engage users by revealing ecological and cultural phenomena, processes and relationships affecting a site. This kind of approach brings out the opportunity for people to reinforce interconnection and mutualism to its existing environment.

In order to produce the design, the phenomenological method will be explored to reveal both existing ecological and cultural systems. The Agricultural landscape particularly to green-gold rice fields of Sta. Rita, Pampanga, as a study area, provides a unique ecological process where meticulous traditional farming methods rely on the cold wind monsoon or "Amihan" wind as a significant component in generating the distinct rice. Their agricultural way of life embeds the strong culinary practices which are evident to their locally produced pastries and festival celebrations. The site offers an organic processes and phenomenological experience of landscape.

The study will contribute to peoples' awareness and restore connection through environmental education and offer inimitable know-how of ecological processes. Also, attract more appreciation, recognition, and support from the local government unit in preserving rural landscapes. And lastly, strengthens its identity as an agricultural town and perpetuate their living knowledge and be transmitted to the younger generation.

Keywords: Eco-revelatory Design; Agriculture and Ecological system; Rural Landscape

#### 1. INTRODUCTION

The significant role of rice predominantly to culture and the social aspect is much reflected on a daily basis in the life of a Filipino. Aguilar (2008) emphasized that rice is integral to the Filipino concept of a meal. It is the basis of commensality, defining small local entities, particularly the household and its associated relations. But on the other hand, the process of planting and harvesting it is not highly appreciated and tend to carry out ignorance about the natural systems such as landscape, agriculture, and environment to people. Agriculture, in particular, plays a big spot as a culture for every Filipino. The vastness of fields can be seen in different regions, which reflect the richness abundance of our land and associated values, and traditions that evolved because of how man's actions to its environment.

Currently, landscape architecture is more evident on the aesthetic values of any development. People perceive it through softscape showing different plant species, building materials, colors, and textures. Landscape in this tradition focused on symbolism, artfulness, and abstraction, revealing an innate desire to project meaning and order onto the environment (Friedmann, 2012). But on the other hand, ecologically landscape design produces a naturally designed approach which is visible in rural and peri-urban areas. This kind of procedure enhances the ecological systems aesthetically.

Because people lack knowledge about our natural systems largely to rural areas, it raises the question on how can landscape architecture be of service to uphold the values of the existing agricultural landscape especially in the case of Barrio Sta. Monica? At the same time, how can it be designed to resolve, reveal and educate users about the existing ecology and cultural issues?

#### 1.1 Goal, Objective & Significance of the Study

The main goal of the study is to reveal the ecological and cultural process of Sta. Monica's greengold rice fields. The design-based output will translate the experiential learning integrating landscape architecture. In order to achieve the aim, the resulting objectives are as follow, first is to assess and define the physical context of Sta. Monica's agricultural landscape. Next is to apply the method of transect to facilitate the place-making of Barrio Sta. Monica and lastly, integrate Eco-revelatory design approach to come up with a solution. Moreover, the significance of it will enhance the viability of their agricultural practice and their culinary tradition. Attract more appreciation from local and tourist, recognition and economic support from the local government unit. Lastly, strengthen its identity as an agricultural town, preserve their living knowledge, and be transmitted to the younger generation.

#### 2. FRAMEWORK

The research paper will adopt the concept of Eco-revelatory design (ERD) which is an ecological design concept in the field of landscape architecture in which Harkness (as cited in Arisoy, 2013) described it as "a design strategy that attempts to enhance site ecosystems as well as engage users by revealing ecological and cultural phenomena, processes and relationships affecting a site" (p209). Landscape architects reveal nature through their form, materials, and formation, and they reveal the nature of the person who designed them. It is another method wherein the main ingredient of the design is ecological processes and existing environment (Arisoy, 2013). In this manner, ERD will highlight the ecological and cultural process of Barrio Santa Monica, particularly to its agricultural landscape in order for local to uphold their landscapes and at the same time create learning about the natural system to locals, tourists, researchers and future generation. Figure 1 presents the components of ERD that Arisoy pointed in instigating design strategies for ERD.



Fig. 1. ERD Components (Arisoy, 2013)

#### 3. METHODOLOGY

Currently, there are (2) two existing barrios - Barrio San Agustin and Sta. Monica that produces the particular green gold rice grain. Due to time constraint, the design-based research study will only focus on (1) one barrio that will be used a site study in conducting the ERD. The methodologies for the study were divided into (4) four phases:

#### 3.1. Observation

The existing agricultural farms of Sta. Monica will be visited and investigated together with the tourism officer/s, photo documentation and sketches will be prepared.

#### 3.2. Discourse Analysis

The researcher will conduct a key informative interview with the Tourism Officer as well as the local farmers of Sta. Monica, Pampanga.

#### 3.3. Descriptive Survey

Mapping out the existing agricultural boundaries of "duman" rice fields will be executed using Google and satellite maps. Existing maps from the LGU will be verified for its consistency.

#### 3.4. Finding Analysis

Examination of all gathered data and the output will be a Conceptual Master Development Plan.

#### 4. ANALYSIS

The first stage of the analysis will assimilate theory of transect which according to Andrés Duany and Emily Talen (2001) it is a "geographic cross-section of a region used to reveal a sequence of environments. For human occupied environments, this cross-section can be used to identify a set of habitats that vary by their level and intensity of urban character - a continuum that ranges from rural to urban". (p.1453) The environment that was observed will be the basis in shaping the components of the existing condition of a place. The authors pointed out that the human habitat comprises of building, the lot, land use, street, and all of the other physical elements. The transect along rural and urban produces "immersive" environments which will be implemented in identifying the zoning character along the study area.

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Fig. 2. Aerial Map of Barrio Sta. Monica

Base on the initial site observation, transect started at the Municipality Hall of Sta. Rita to act as the starting point to fully understand the environmental context from the Town Center up to Barrio Santa Monica. The research study was divided into five (5) transects to describe the existing conditions. Figure 2 displays the allocated zones description of the Municipality of Sta. Rita. The scope of this study will focus on the area of T4: Agri-Rural Zone.

a. T1: URBAN ZONE. This zone comprises the Town Center of Barrio San Vicente. The municipality hall, other Government agencies, market and old churches are located here. The zone acts as the main component of the municipality.

b. T2: SUB-URBAN ZONE. These are the areas from the outskirts of the urban zone. Linear settlement mostly comprises the area due to the existing main road as the mode of accessibility, trade, and commerce. In terms of structures, bungalow and two-storey residences are erected alongside the roads.

c. T3: RURAL ZONE. This zone showcases the starting point of the ruralscape of Barrio Santa Monica. Houses can be seen along the side of the roads but the farms are only accessible at the backyard. Trees can be seen as well as streetscape element.

d. T4: AGRO-RURAL ZONE. The landscape of the zone reflects the agrarian lifestyle of the locals. Moreover, the built environment is mixed with modern houses and "bahay na kubo" or traditional Filipino houses.

e. T5: AGRI ZONE. The landscape of this zone is much reflected with rice and duman fields. The agrarian life is completely recognized because of the isolated houses that manage the existing farms.



Fig. 3. Zoning of Spaces and Activities



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Figure 3 features the zoning process in creating an experiential landscape. It starts with the entry point and extends to the local community. Furthermore, instigate an agri-linear park and accommodation to tourist or visitors. The proposed Master Development Plan of the project proposal evolved from its two (2) component - Ecological process and cultural process. In this manner, ERD targets to identify these in order to create a design that will enhance the site and at the same time preserve the culture that evolved because of the existing condition of the environment.

#### 4.1 Ecological Process

According to the Comprehensive Land Use Plan of Sta. Rita, their agricultural land comprises of 82.60% which made them an agricultural town. Most of the 10 Barrios are agrarian which plants rice and mixed crops. On the other hand, there are at least two (2) barrios - Barrio San Agustin and Sta. Monica that has distinct rice fields which are called "duman". These are special rice that was started during the Spanish Regime in the country and they were the only barrios who manage to preserve and continue utilizing their agricultural lands. It relates much to the natural elements. Apparently, it will not be produced without the help of the cold wind monsoon or "Amihan". It is planted during the early months of August to October and harvests it on the first week of December which is celebrated as well through Duman Festival.

#### **4.2 Cultural Process**

The green-gold grains are revealed on their culture and one of the values is their culinary lifestyle. They are being used as main ingredients in cooking pastries, sticky rice, and the likes during Christmas Season. At the same time, it is much expensive than the ordinary rice or "bigas na malagkit" because of the meticulous process to extract it. In their Duman Festival, they exhibit their products and promote their planting and harvesting traditions through cultural shows.



Fig. 5. Entrance Perspective

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This the first point of the eco-revelatory design which will serve as the landmark of the experiential landscape development in Barrio Santa Monica. The naturalness aesthetic aims to promote planting existing vegetation, plants and indigenous trees.



Fig. 6. Visitor Center Perspective

The visitor center will be a gateway for local and tourists to understand the ecological process of the "Duman" agriculture. At the same time, it will be a structure that will showcase the unique culture of farming-life in Barrio Santa Monica.



Fig. 7. Planting Area Perspective

It will be an area for planting different crops for the students, locals, and tourists, throughout the year. The experiential landscape does not only limit through observation but rather provide a place for immersion that will inculcate Santa Monica's traditional farming.

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Fig. 8. Viewing Deck Perspective

It is a community area that will be used by the local community for their meetings and cultural discussion. Moreover, promotes collaboration between locals, tourists, and researchers. Seating area or "luklukang dutung" are provided as well that can be used by students and converted to study area. Viewing Deck "Bista" will be a place to witness farmer doing their traditional way of planting and harvest time. Furthermore, appreciate the scenic agricultural views of Barrio Santa Monica.



Fig. 9. Rural House Perspective

It was developed to be an accommodation area for tourists who wanted to experience the rural way of living. The existing conditions of the rural houses needed to be revamped in order to cater a decent lodging for tourist and can be tagged as "Airbnb" destination in Sta. Rita, Pampanga.



It will serve as a terminus of the linear park. It will be highlighted by a circular bridge that will be used as a viewing deck to appreciate the 360-degree aerial views of Barrio Santa Monica. It will also serve as an iconic landmark of the development.

#### 5. CONCLUSION

ERD or Eco-revelatory design approach is a strategy that creates a balanced development between existing culture and environment. The ecosystems play a vital part in imparting knowledge about the natural system, cultural phenomena, process and relationship of man to its nature that people tend to oversight. In the field of landscape architecture, landscape architects should enhance the visitor's experience by promoting interaction between the locals and their existing environment. Integrating the concept of ERD must carry out a legible and clear mission. Observable and visible environment embedded with culture must be attained. The multi-functionality of the place must raise curiosity about the place and let users initiate their senses to learn and appreciate the process.

The fields of Barrio Santa Monica embody an ecological and cultural process which made it very distinct among the other agricultural towns. The application of ERD brings back people to nature and revamped the mutual relationship of man to its environment through design.

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Fig. 10. The Loop Perspective
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# City Ecozoic: A Biosynthetic Future in Haebangchon, Seoul, South Korea

#### ABSTRACT

Seoul, as the capital city, has grown rapidly into a metropolis since "Han River Miracle". However, Haebangchon, an old residential area located on the south of Namsan Park in Seoul, develops in a different way from the central city area. Specifically, the large population density, the disordered traffic, the lack of green public space, the biological barrier and the oversimplifying commercial format are considered as negative aspects involved in the city's future. In this case, several strategies aiming in creating a more socially sustainable model of urban regeneration are proposed. First, it is suggested to plan urban complexes and high-density mixed communities, with reconstruction of buildings. Second, some green area and hidden public space should be opened, while wildlife passages built mainly based on roof gardens are supposed to bring about city biodiversity. Third, the encouragement of urban agriculture and forestry and more relevant industries could better the economic state.

**Keywords:** Urban regeneration; Future city; High density; Biodiversity; Economy

#### 1. BACKGROUND

With the rapid progress of urbanization, natural habitats are gradually reduced in urban sprawl. It should be noticed that the whole ecological environment was separated by reinforced concrete, and the communication between organisms was interrupted. At the same time, the imbalance between urban areas also brings more social problems. Therefore, under the dual challenge of the natural environment and social environment, some urban historic areas need sustainable renewal. In this case, the city would be revitalized.

#### 2. SITE CONTEXT

Being part of Yongsan-gu District of Seoul, the Haebangchon is on the south of Namsan Park, which is only 3 kilometers away from the central city. Meanwhile, the business district of Itaewo is placed on the east side of Haebangchon. In addition, two subway lines and the Seoul train station nearby, are bringing thousands of people all the time.

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#### 2.1 Natural Environment

The site is located to the north of the Han River in Seoul, and it also adjacent to Namsan Park which is the biggest park in Seoul. Apart from this, Yongsan US Base is in the southwest of the site. Since the removal of US Army in 2017, the base is planned for conversion into a large urban park including the habitat for wildlife. Surprisingly, in these areas above, the largest number of plants and wildlife in Seoul could be found.

#### 2.2 History and Humanity

The outbreak of several wars in history has made the development of the site far behind the surrounding areas. Even for a time, it was a gathering place for low-income people, namely, the slums of South Korea. Nevertheless, history and war also brought unique charm of combining Korean and Western to this land. The exoticism is full of urban features, and the people of all colors are found in the streets. Cultural diversity provides infinite possibilities for urban renewal in the future.

#### 2.3 Public Space

Due to restrictions on the height of the surrounding buildings by Yongsan US Base, the building density in the site is too large, and the narrow alleys between buildings are not satisfying. Beyond that, the roads are densely covered with small scale streets and ladders, and the streets have a large slope. Simultaneously, the residents occupy some area of public space and greenfield, to meet the needs of living space. And the lack of greenfield makes the site and the surrounding natural environment greatly different, reducing the life quality of citizens.

#### 2.4 Industry and Regional Vitality

According to a survey conducted by a group in Seoul, the industry mode inside Haebangchon is excessively simple. To be more specific, the major industry is retail trade, while the tourism and some relevant trade survive. Likewise, there are only two high schools and five church buildings in the site, which cannot meet the demand for public education and cultural exchanges. Meanwhile, the Seoul Municipal Government has also proposed the revival of the forestry economy to this area.

#### 3. CITY ECOZOIC

"Ecozoic" was raised by Professor Thomas Berry in the context of a series of environmental problems brought about by the globalized industrial world. This is the fourth life era after the Paleozoic, Mesozoic and Cenozoic. During this period, human beings, along with other lives, are living on earth in a way of mutualism. The human right to live should respect the right of habitation of other living beings, not to give way to the interest of mankind.

"City Ecozoic" means that in the future city, human is no longer the only subject of the city, and all living things will become urban users and participants. For this purpose, the city needs to change its original highly rigid appearance, and inject more green space for the survival of animals and plants. At the same time, the mutually-beneficial symbiosis among all the creatures stimulate the development of relevant industries and enhance the vitality of the city.

#### 4. STRATEGY

Starting from being transformed, the buildings selected to be experimental units would gradually influence the surrounding. Then, this changing mode could be drawn or copied by blocks nearby, which tends to be the self-renewal. Finally, the whole urban area will be updated to create a biosynthetic future on Haebangchon. "City Ecozoic" is a systematic process of succession, which is divided into three stages, namely, implantation, propagation and succession.

#### 4.1 Implantation

In accordance with the housing quality and safety standards and historical and cultural values, the buildings in several pilot areas are preserved, repaired, reformed or rebuilt. In the process of rebuilding, the roof green space and vertical greening will be built, while liberating the ground surface as public space. In the meantime, the space of the wildlife corridor is reserved by the construction of the urban complex.

#### 4.2 Propagation

Affected by the renewal of pilot areas, the surrounding areas will gradually transform the building and public space, and continue the construction of roof green space and vertical greening. After the combination of bridges, balconies and roof gardens, the reserved space for future wildlife corridors could be seen in this stage.

#### 4.3 Succession

It is obvious that more sporadic space and buildings would be reorganized, which is tend to free up more public space and form a green space system. Wildlife corridors will also extend to Namsan Park and Yongsan Park. In this way, the originally separated natural habitat will be reconnected to achieve the flow between species.

#### 5. CONCLUSION

There can be no doubt that through urban design, the future of Haebangchon will be an organic whole with biodiversity, landscape diversity, cultural diversity and industrial diversity. The specific changes will be reflected in the following five aspects.

#### 5.1 Renewal of Buildings

On the premise of retaining the city road, respecting the city texture and protecting the characteristic facade of the main streets, the building is transformed, the ground space is released, and the multifunction urban complex is built. By using the characteristics of large building density and diverse population, combined with building renovation, the high-density mixed-use communities will eventually be established.

#### 5.2 Reforming of Public Space

Large amounts of green space were built on the ground, in the air and on the roof. This not only softens the hard space, but also creates potential public spaces. At the same time, combining the construction of urban complex, more multidimensional public space will become the place of public communication. Finally, they will combine with green space to become the public space network of the city.

#### 5.3 Establishment of Wildlife Corridors

Based on roof gardens, a wildlife corridor is built across the city and connects Namsan Park and Yongsan Park to achieve the flow between species. In the meantime, introducing creatures into the city will change the ecological environment system of the city and enhance the mutual understanding between human beings and creatures.

#### 5.4 Sustainability of Industry

With the increase of green space, urban forestry and urban agriculture will rise in the region. Not only that they combine the tourism related industries to establish the economic cycle mode of "planting processing - experience - recycling". It is worth mentioning that the introduction of wildlife corridors will not only bring more medical and health industry, natural education industry and cultural tourism industry to the city, but also promote mutual promotion between industry and environmental protection.

#### 5.5 Promotion of Regional Vitality

Because of the networking of public space and the diversification of industries, the original sporadic urban vitality areas will be reintegrated and promoted. In the future, Haebangchon will form a vibrant city with the urban complex as the point, the street and the green corridor as the line, and the highdensity mixed-use communities as the surface.

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# Ang-Sila langsaen Beach

The beach is located in Saensuk municipality, Chonburi, 100-km east of Bangkok via the national highway. The 5-km sandy beach lines north-south with the ocean on the west side. The whole length of the beach bordered with the beach frontage road and a parallel main street, 300 meter further east with east-west alleys connecting in between. The upper section of the beach, connected to 1-km rocky beach called Laem-Tan cape and Sam-Mook cliff, one of the most well-known scenic spot with over 100-year-old aquaculture and tales. Most of the land at the upper beach is government owned and used as bungalows, resort and government offices, resulting in much more open spaces, both along shorelines and the inland. In contrast, the lower beach is much narrower and mostly private owned. Thus, the development was much denser and less controllable. The land uses were mixing of apartments, hotels, restaurants, schools, university and local fishermen village.



**Reimagine Bangsaen Beach : Framework for the next chapter** of an ever-changing cultural and ecological Beach

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#### ABSTRACT

The master plan study was a collaboration effort among multidisciplinary teams using participatory design process to involve local stakeholders and establish the common goals to bring sustainable future to this Beach. The overall study proposed many aspects of urban and landscape planning and conceptual design for 3 pioneer sites. However, this paper will only address the master plan framework, proposed under the initial vision: "Healthy City and Contemporary Beach Town for All". The framework consists of 4 aspects: Ecological concerns, Nostalgia of Bangsaen Beach, New sense of place, and Pleasant experiences. In case of any future changes to the detailed master plan, this framework is still expected to be used as overall guidelines for the municipality, so that Bangsaen Beach could still be reimagined in the same vision and goals, positively and thoughtfully set by Saensuk people today.

Keywords: Bangsaen Beach; Master Plan; Framework; Recreated Identity; Cultural Conservation

#### **1. INTRODUCTION**

Bangsaen Beach is an 80-year-old famous tourist beach of which popularity had been decreased during past 40 years due to industrial expansion to the region and increasing tourism growth at other beaches. Left with degraded image and middle/low income tourists, Bangsaen Beach was, on the other hand, full of potentials, ranging from its cultural and ecological history; diverse population and culture; more importantly, strong and positive vision of the current mayor to bring back the positive images of Bangsaen within contemporary context.

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Fig. 1. The study area for Bangsaen Beach Master Plan

The study of Bangsaen Beach master plan for Saensuk Municipality aimed for 3 objectives

- To frame the overall physical beach development that may be used as tools for further 1) implementation and annual budget plan.
- 2) To Illustrate possible transformation of the beach according to the master plan, through conceptual design of 3 pioneer sites
- 3) To encourage involvements of Saensuk people in the planning and design for sustainable future of Bangsaen Beach

The content of the proposed master plan covered many aspects, including revised activity zoning, sustainable transportation system, facilities distribution, shoreline ecology mitigation, aesthetic, and conceptual design for pioneer sites. However, this paper will emphasize only the framework for the re-creation of Bangsaen Beach identity and sense of place, established through the integration of inventory-analysis-design. The 5-month study process was conducted through the brief field research 'to get initial data for participatory design workshops, done in small groups with informal atmosphere, that helped rechecking and confirming the previous data and became the beginning stage for vision and preliminary design. In these processes, series of questions were asked to reflect the hypothesis set by the research team, such as: the first impression of Bangsaen Beach, positively and negatively, the comfort and orientation in this monotonous beach landscape, the 10-year future for the municipality, the near future of the 3 pioneer sites. Finally these design solutions, both for the master plan and the 3 pioneer sites were refined and worked out in details through the brainstorming sessions among the multidisciplinary team.



Fig. 3. The participatory design workshops and the field research process

#### 2. THE STORY OF BANGSAEN BEACH

#### 2.1 From Ecological Uniqueness to Cultural Establishment

Bangsaen Beach native landscapes comprises 3 characters: clay beach, rocky beach and sandy beach. This unique geological combination made Bangsaen Beach the first grain of sandy beach closest to Bangkok. Human settlements around this area started northern of Bangsaen Beach, over 100 years ago, at Ang-Sila, as a small port town and fishermen villages that benefited by plenty fish and seashell from mangrove shorelines and small tide pools at the rocky cliff and cape. Later, in 1950s, had become modern era for beach vacation settlement at the sandy Bangsaen Beach, named after the old romantic tale of 'Mr.Saen & Ms. Mook.The town was also called "Saen-Suk", meaning 'much of happiness', reflecting the pristine natural characters such as the sunset scene over the infinite skyline, large rocky cape and coconut grove. Another important history was the story of ASEAN establishment, which started here in the meeting at General Thanarat's beach house, located at Laem-Tan.



Fig. 4. Old scenes of Bangsaen Beach cultural and ecological history

#### 2.2 From social and cultural changes to ecological degradation

The increased popularity of Bangsaen Beach had have negative effects on native ecology of the beach since 1980s. These included the construction of frontage road and bungalows over the existing sand dune; the expansion of affordable tourist facilities such as parking lots, food stalls, public toilets. The beach landscape then became eye-sores for many visitors. The lower beach was effected more by the new frontage road built to gain public access to the beach once occupied by fishermen. Along with higher density private beachfront development, the road structure had worsen the shoreline erosion problem. Moreover, the urban expansion in Saensuk municipality had taken over other green spaces for more housing to serve the new comers including young and educated Thais from nearby industrial town and retired European. Bangsaen Beach then became the only public green space left. Three large concrete decks were built over the shoreline to serve as multi-purpose plaza, for recreation and festivals. All this development was to fulfill cultural needs for the modern Bangsaen Beach while placing negative effects on shoreline ecology.

#### 3. LESSON LEARNED BEFORE THE RE-IMAGINING OF BANGSAEN BEACH

Results from field researches, 1st participatory workshop and several brainstorming sessions helped summarize the original identity of Bangsaen Beach, positive and negative aspects and finally the goals for future development.

#### 3.1 The identity, positive and negative aspects of Bangsaen Beach

In summary, the origin of Bangsaen Beach positive and unique characters was derived from its unique 'natural characters' that created the 'relaxing and easy-going atmosphere' as shown in fig.5., followed by the 'local culture and activities' related to such environment, including traditional fishing, old tales, family recreation, seafood and walking street. All these characteristics made Bangsaen Beach a place for happiness and memory that many people could still related. There were also other potentials such as the largest public green space in the municipality, convenient access, population diversity, increasing of young and educated residents, and promising future policy from the positive and visionary Mayor.

On the other hand, some negative aspects of Bangsaen Beach were presented and mostly related to unnatural and chaotic man-made elements such as traffic congestion, car parking, teenager racing, hash and dry concrete structure. Other threats including shoreline erosion, degrading of beach ecological diversity, and historical unawareness of new residents

The future plans for Bangsaen beach must take into account both positive and negative aspects in order to bring Bangsaen Beach away from stagnation and to discover the balance of conservation of historical resources and development for cultural needs.

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Fig. 5. Result from field research showing Bangsane Beach scenes from the most preferred to the least preferred scenes

#### 3.2 Aspiration and Vision for Bangsaen Beach

The initial vision for Saensuk Municipality and Bangsaen Beach development was set up based on summary from the first workshop and the SWOT analysis as the 'Healthy City and Contemporary Beach Town for All'. It is to address the balance among aspects, such as: locals-tourists' need, relaxing-extreme activities, historic-modern characters, conservation-development. The workshop also concluded the keywords for each pioneer site:

Site1: Leam-Tan multipurpose deck : exercise/ recreational fishing/ music/ movie night

Site 2: Leam-Tan cape: landmark of the city, historical learning

Site 3: Won-Napa (south end of the lower beach): community activity, meeting place, park

From this vision and keywords, Bangsaen Beach master plan framework and conceptual design would be developed accordingly.

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#### 4. MASTER PLAN FRAMEWORK : THE NEXT CHAPTER OF BANGSAEN BEACH

To re-create the story of Bangsaen Beach and bring it to the next chapter, 4 major aspects must be emphasized as framework for the master plan.

#### 4.1 Ecological Concern: the origin that must be preserved

Conservation and development zones were set in 3 levels, corresponding to the beach ecological profiles, in order to preserve the natural characters, the most valuable asset that was the origin of this Beach. This acted as the critical framework for the whole transformation of Bangsaen Beach.

- Preseravation Zone: Vulnerable for climate variability. No permanent structure allowed except for safety uses such as lookout towers or security checkpoints.
- Controlled Activity Zone: Climate conditions somewhat stable with some native plant growths. Beach recreational uses with small buildings/structures to support such activities.
- Development Zone: Stable climate conditions and variety of plant community. Suitable for permanent structure with height and land use controls.



Fig. 6. Conservation and development recommendation zones for Bangsaen Beach.

However, there was a constraint from private ownership along the lower beach as shown in fig. 6. Since Saensuk Municipality could only proposed changes within the public area, the private land, although very close to the shoreline, was assigned as 'development zone' This was in fact one of the major concern for the master planning team since the shoreline erosion problem would only got worse in the long term.

## 4.2 Nostalgia of Bangsaen Beach: Enhancing the positives, eliminating the negatives

The original 'impression of Bangsaen Beach' shown in fig. 7, is at risk of being faded away, not only because of the ecological degradation, but also from visual pollution stated earlier. To bring back the 'preferred scenes' of Bangsaen Beach, sustainable transportation strategies were proposed, including road diet, traffic calming techniques at the frontage road, together with the park & ride facility near the East main road and the collector streets. 'Clean and clear' strategy was also proposed by rezoning and organizing kiosks, food stalls, rental deck chairs and parasols that currently blocking views access roads roads to the beach. More open spaces would be provided to enhance the scenic views and encouraging activities related directly with the beach, the sea, and the sky-known as the nostalgia of Bangsaen Beach.



Fig. 7. The original identity and the proposed new characters of Bangsaen Beach.

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- Beach Ocean
- Natural Setting
- **Relaxing** feeling
- Happiness

## **Bangsaen Beach New** characters and Activities

- Creative Learning •
- Recreation
- Art and Entertainment ٠

#### 4.3 New Sense of Place: 'Playful Bangsaen', The beginning of the next chapter

Because of the context changes, Bangsaen beach could not possibly return to its glorious romantic story. From the study of other beach towns and tourism city development, it was guite certain that Bangsaen Beach needed an intervention to rejuvenate with fresh and new characters. However, this 'new story' must be built upon the original identity to avoid gentrification, which would be the loss of Bangsaen Beach original spirit.

Combining the potentials and the aspiration of Bangsaen Beach with the concept of Active Tourism, the team then proposed the theme 'Playful Bangsaen', adding new characters and activities to make tourists and locals enjoy Bangsaen Beach in more 'active' ways. These included: interpretation of Bangsaen stories via public art, edutainment activities for family such as sand castle lesson, public BBQ area, beach concert/movie nights, DYI souvenirs from fishing tools, boat painting, etc. These activities were meant to bring more active and friendly atmosphere to the Beach, as well as encourage positive interaction and relationship among diverse user groups.

#### 4.4 Pleasant Experiences : Orientation, Comfort and Aesthetics

The 4th element of the master plan framework was to make sure that, not only the special activities, but also the subtle pleasant experiences would be provided all over Bangsaen Beach as a place for real happiness for everyone. Thus, the disorientation and boredom feeling along this 6-km monotonous landscape must be mitigated. In fig. 8, four activity zones were assigned with special roles and characters reflecting old and new stories of Bangsaen Beach, which would be told through the landscape and helped creating unique atmosphere as well as providing memorable landmarks. Spaces for various activities and facility nodes, responded to site potentials and different needs of locals and tourists, were also located to give choices for everyone, as well as improve aesthetic perception and a feeling of invitation to visitors.



Fig. 8. The proposed zones to be assigned new unique characters.

#### 4.4.1 Zone 1 : Festive Life : Regional Center

The northern most of the beach is the location for original history of Bangsaen Beach, culturally and ecologically. This was where the first grain of sandy beach were formed; the meeting that led to establishment of 'ASEAN' occurred at Laem-Tan beach house of General Thanarat; the beginning of fishermen culture was settled first at Sam-Mook cliff and Ang-Sila. Thus, the zone was proposed to be the 'Regional Center' and the node of city festivals and history celebration. The beach house, currently belong to the government, was proposed as Bangsaen Story museum, gallery, coffee shop & library, where people can spend time hanging out and learning about Bangsaen Beach in every aspects. This area was also the location for 2 pioneer sites, the currently underutilized concrete decks, which would be redesign as a new landmark and city public spaces.



Fig. 9 Proposed landmark, activities and atmosphere at 'Festive Life' Zone

Photo credit: Sanitas Studio

#### 4.4.2 Zone 2 : Joyful Life : Tourism Center

The 70-meter wide upper Bangsane Beach with the old memory as a place for enjoying beach vacation had great potentials as the major greenspace for Saensuk Municipality. The zone was assigned ' Tourism Center', according to its existing uses. The new activity node called 'Saensuk Club' was located on the municipality property, hosing a small museum, community library, multipurpose lawn, car parking structure mixed-use with commercial. The new gateway and one-stop-service visitor center for large group of tourists were also proposed at the intersection of the major access road to provide services such as parking lot, shuttle bus stop, bike rental, souvenir shops, and pocket parks for locals. Moreover, along the 2.5-km length of the beach, variety of fun and active beach activities were grouped in order to separate passive and active zones, so that the choices of activities and atmosphere were provided for different user groups, as well as increasing efficiency for services.



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## 4.4.3 Zone 3: Social Life : Welcome Plaza

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The well-known Bangsaen Rotary with the gigantic and most remembered landmark of Bangsaen, situated at the end of main access road bordered between the upper and lower beach. This area, according to its prime location, was proposed as the 'Social Life' zone and a 'welcome plaza' for visitors and locals. The existing asphalt parking lot around the landmark would be transformed to an attractive plaza with water feature, seating and amphitheater, acting as a foreground of the beach view, currently blocked by the mass of cars. The plaza would be the location for modern-style urban events, such as music festival, movie night, and other social activities. This place would provide the visitors with very positive first impression, as well as give the locals pride of their hometown.

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Fig. 10 Proposed Tourism Center and activity node in 'Joyful Life' Zone



Fig. 11 Proposed landscape to transform the view for first impression at 'Social Life" Zone

#### 5.4.4 Zone 4: Artful Life : Local Center

Due to limitation of space and shoreline erosion problem, the lower beach zone could not support all needed activities. However, the diversity of people, such as fishermen, college students, small kids, local elderly, young and educated residents, were great potentials. The 'public art', which could take place in any form and size, was proposed as a tool for creating unique characters for this zone by integrating an art into landscape elements. The art themes must build upon the existing story such as traditional fishing, natural phenomena, beach ecosystem, or even the shoreline erosion issue, as a way to informally transfer local knowledge to the new comers. The potential art events organized by the municipality and art students could also establish great relationship among diverse users. There was also the 3rd pioneer site, which would be redesigned as 'Local Center' for community recreation and gathering space, and eventually attract certain groups of visitors, who like to merge themselves with local culture, and this is actually the concept of Active Tourism at 'Playful Bangsaen Beach'.











Fig. 12 Proposed design for community spaces for the Local Center and the story-telling landscape elements at 'Artful Live' Zone

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#### 6. CONCLUSION

As the framework for Bangsaen Beach master plan has established, Saensuk municipality now has the clear goals and more concrete directions for future development of Bangsaeen Beach. This framework is in fact very critical since the implementation period for developing the whole length of the beach would take guite a long time and any future changes could possibly occurred and might have effects on other detailed aspects of the proposed master plan, including the design for each pioneer sites. The municipality must be able to adjust and adapt their implementation plans to respond with those changes. In that case, this master plan framework can still act as the overall guidelines for the municipality and other stakeholders, so that they still be able to reimagine Bangsaen Beach in the same vision and goals that positively and thoughtfully set together by Saensuk people today.

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# Tourism Development in the Mahakam Ulu River as an Effort to Preserve the Culture and Ecology of the Region

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#### ABSTRACT

The Mahakam River is one of the largest and longest rivers in East Kalimantan. Mahakam River passes several districts, one of them is Mahakam Ulu District. This area is still isolated mostly but has a wealth of cultural, ecological and myths are abundant.

Since the past centuries, the Mahakam river plays an important role for the life of Dayak tribe people who live along the river borders. The Mahakam River is a source of livelihood and vital transportation routes. With its abundant water, the existence of this river becomes important with the support of good river border conditions.

The research and studies conducted show the abundant potential to develop the Mahakam Ulu area as a nature-based tourist destination. The natural potentials formed from mix of the jungles and the limestone wall stretching from north to south on the river side offer exotic panoramas. The challenge of the cruise line that passes through the cascade combined with stone walls and high waterfall offers a unique experience. The culture of the people who deeply appreciate nature through the riverside preservation procedures, the unique forest harvesting and cropping procedures contribute to the high ecological preservation.

The greatest challenge is to stop the conversion of primary forests into oil palm plantations, resulting in diminishing forests, destructive regional water systems and the surrounding Mahakam river, reducing local people's income from forest products and river products.

Through the arrangement and development of tourist areas are expected to realize the potential of the surrounding community environment that also helps maintain and keep the surrounding area and get added value from tourism activities in the region.

Keywords: River Border, Mahakam Ulu, Preservation, Local Wisdom

#### 1. INTRODUCTION

Mahakam Ulu (Mahulu) District is located in East Kalimantan, with the capital of Long Bagun. Bordered by Malaysia in the North, Kutai Kartanegara District in the East, Central Kalimantan Province in the West, Kutai Barat District in the South. The land is mostly covered by forests and plantations belonging to the local (customary land) and companies.



Some areas of Mahulu District are transformed into mining areas, oil palm plantations that destroy the ecological order of tropical rainforests. Many border rivers have only a thin forest on their banks. which the locals call a screen savers. Mahulu's population strives to protect their forests by managing customary forests, conserving rivers and forests, resisting tough land conversion to mining and oil palm plantations.

The cruise line in Mahulu District has its own charms and challenges. On the Tering - Long Bagun shipping line, on the right side of the river is the limestone wall of Bato 'Kelog which became the graves of the Dayak kings in the past. Waterfall on the left and right side of the river that has a variety of highest with stone walls perpendicular. On the Tering - Long Apari cruise line there are the cascades.

The Mahakam Ulu District Government is determined to develop the Green Economy concept in the region. Concepts that support cultural preservation and the ecology of the region. This program touches various fields such as local plantation, general and special tourism, among others visit programs and homestays in dayak tribal villages along rivers, white water rafting, tourist parks and tourist villages.

Information:

- Mahulu regency has 5 (five) districts: Laham, Long Apari, Long Bagun, Long Hubung, Long Pahangai.
- Study location in Long Pangahai district and Long Bagun
- Part of a river basin Mahakam upstream along the 229 km.
- 135 514 m ASL

Fig. 1. Map of study location. Source: RTRW 2011-2013

#### 2. RESEARCH METHODS

The research method used is observation, experience living in Dayak tribe environment and interview with indigenous elders and Chairman of Tribe. The results of this survey are comparable to various sources of academic research and adventure experience to the site.

#### **3. POTENTIAL AND CONSTRAINTS**

Mahakam Ulu (Mahulu) District is located in the heart of Borneo. Its territory is largely still covered by the tropical rain forest that became the lungs of the world. This area is gradually experiencing ecological degradation due to the transition of land use into settlements, mining areas and oil palm plantation areas. Population settlements are located at the border of the Mahakam river flow with consideration of easy access to transportation. Mahakam Ulu District inhabited by Dayak Apokayan tribe which is divided into sub tribe Dayak Kenyah, Dayak Kayan and Dayak Bahau Busang / Glat. These tribes inhabit the watershed area of the Mahakam River.

#### 3.1. Accessibility

Mahulu District does not yet have adequate land and air transportation. The main transportation uses the waterway with Samarinda - Kota Bangun - Tering route and Tering - Long Bagun - Long Tuyog -Long Apari route. Long Apari is the northernmost region of Mahulu district. This water transport also has obstacles in the form of malignant cavities as many as 13 pieces along the Tering - Long Apari shipping line. However, this cruise line presents incredible views on both sides.

In each village there is a dock or harbor, depending on the busyness of the local cruise line. Mode of transportation used is a speed boat with one or two machines, canoe, long boat. ASDP Mahulu sets strict requirements for speedboats and motorists that will cross the cascade. Motorists will drop passengers on the side of the river before blocking the cascade, if considered dangerous cascade conditions. Passengers will reach the ramp and climb up to the riverbank through the cascade below. Meanwhile the motorist passes through the cascade with an empty and lighter speed boat.



Fig. 2. http://deviyantini.blogspot.co.id/2015/03/

Access by land and air is being developed by the State. Datah Dawai Airport in Long Pangahai is being upgraded and the Long Bagun Airport is under construction. Land access typically uses mining or plantation roads while the State is building roads that can connect the main villages of Mahulu.

#### 3.2. Dayak Tribe Villages

Dozens of Dayak villagers are scattered along the Mahakam river. Generally every village has tribal chief (traditional Elders) and Lurah (government officials). The village facilities are generally 1 unit of Lamin House, 1 unit of Balai Adat, 1 unit of Elementary School, 1 village field usually used for Hudog ceremony, 1 volleyball and badminton field. Health centers, shops and schools at a higher level are located in villages close to the center of government. Religion facility depends on the village main religion.



Fig. 3. Lamin, Dayak Tribe's traditional house, and Long Tuyog Village. Source: KSPN Team, 2016

#### 3.3. Socio-Economic and Culture

a. Social

The Dayak Bahau tribe that inhabits Long Tuyog still cling to traditions that believe that if they preserve nature then nature will nurture (overflowing by natural products) as well (Dalong, 2016). Maintaining nature also means maintaining relationships with village outsiders or outsiders of the Dayak Tribe. Every guest who comes to visit will be welcomed and given a bracelet binding fraternity and get the Dayak name as a symbol of acceptance. (Dalong and Aunt Pink, 2016)

In the customary order, every event and decision is discussed with the adat elders. The problems that occurred were brought to the adat council and the sanctions were deemed to be appropriate. The troubling issue of the adat council is that many tribal people are tempted to cross the border and settle there, because of the offer more facilities. This is due to difficult access and traumatic inter-tribal dispute and intimidation in the past (long ear cuts), but today long-eared preservationists and Dayak Tattoos get high degrees on the Dayak tribe.

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#### b. Culture

Dayak tribe in the Mahulu region has a unique culture in everyday life such as procession of rice planting (manugal), thanksgiving ceremony and post planting hope, river and fish conservation, restriction of forest product harvest, weaving and forging equipment.

Equipment used in daily life is generally made by Dayak women, such as wide hats, fishing rods, various food storage containers, betel vases, bags and so on. The main raw materials are rattan and various wood. This rattan is processed and woven into a variety of equipment and containers. Equipment from iron is also made manually at the iron forging site in Dayak tribal villages.

Traditional clothes Dayak tribe is famous for being decorated with motifs formed by many beads. Women wearing Ta'a skirts and Sapei Inoq tops and wearing headband from pandanus (for old women) and uleng (long beaded necklace). The man wore a vest sapei sapaq and a loincloth abet kaoq. Male appearance equipped with Mandau. Usually the customary clothes are used during big events and welcome the great guests. In general there is no difference in motifs used in men's/women's or noble's/ordinary people's clothing, but in some tribes who know caste using horn / tiger motifs for nobles and ordinary people use plant motives. (Bitar, 2017)



Fig. 4. Left to right: 1. Aunt Pink, Dalong and friend. 2. Weaving rattan. 3. Shower & wash in the river. 4. Dayak tribe clothes. Source: KSPN Team, 2016

The Dayak Apokayan have a rice-growing tradition called manugal. This tradition begins around June to August (Barsel, 2014). Activity begins with meneweng (cutting down trees around rice growing area), followed by manyeha (burning crop residues in the area of prospective fields). Sometimes residents should do mangakal (re-burning the land because it is not clean in the first burning). After all these activities then the rice planting will be done if assessed the weather is possible.



Fig. 5. Left to right: 1. Manugal. 2. Fishing by net. 3. Hudoq dance. 4. Kacet Papatai dance. Source: KSPN Team 2016, Nigel Dickinson, https://www.youtube.com/watch?v=6Fkhi5gmn8g, Mustafa Blog

Several stages in the manugal procession according to Barsel (2014) are 1) determining Upun benyi (seeds considered best by landowners). 2) take the Arah Tekap (manugal direction). Rice planting starts from the west to the east, each stop depends on the ability of everyone who follows manugal. Men served as panugal (punching the ground with a stick) and women as the party penyawar (put the seed into the hole and closed the ground again). 3) Hajamuk (playing charcoal). The entertainment procession where they reciprocated each other's face using the rest charcoal from the burning fields. This procession is a symbol of togetherness and harmony of the Dayak tribe in building relationships with others. 4) eat and drink. Breakfast can be glutinous, cake according to Dayak tradition. Lunch at rest or after the procession is finished usually served with rice side dishes and vegetables.

Post-planting procession is a Hudoq ceremony, a mask ritual that symbolizes animals, nature and humans. Its meaning, pleading God's blessing that the planted rice will produce multiples of grain to bring prosperity to society. Hereditary, the festival was held to move from village to village every other year. This tradition is held in September-October. Some dances include: Leleng dance is a dance of Kenyah Dayak tribe girls, Kancet Papatai dance is a dance of Dayak Kenyah tribe, tells about the courage of the Dayak Kenyah men in war.

#### c. Economic

Plantations and agriculture are conducted on land that is considered sufficient to meet the needs of the village. The same thing happens when harvesting crops or forest products. Many fruits that are not harvested due to limited harvests or considered harvested yields are sufficient. As a result many are wasted.

The Dayak Apokayan tribe trades by bartering and using a currency exchange. Bartering is primarily for hunting, farming and forest products conducted away from the crowd. Residents hunted, making wicker and collecting the yield of the farming mainly for sale in Long Bagun, long Pangahai or Tering (transit city and economic center).

#### d. Magic

Dayak tribe is famous as one of the most feared tribes in the world especially after the tragedy of war between tribes. Magical tradition ngayau that hunt head of the enemy before entering the planting period to be the most scary thing. The famous magical things are among others the bird commander who can slaughter without being seen his form, Mandau Dayak sword saber, poisonous chopsticks and magic.

#### 3.4. Watershed

#### a. River and Fish Conservation

The Mahulu community has a tradition of keeping the river environment where fishing and their fields are located. They believe that a quiet environment will bring good crops, so only canoe boats with small machines or oars can enter the area. Community fishing by fishing rod, net, making bait from plants and stone traps in the river.

There is a belief that their ancestors transformed into a kind of fish in the tributary Mahakam, then the Dayak Apokayan abstinence to consume this type of fish. Another type is the famous Arwana fish. Dayak tribe is very strict to limit this fishing after the theft of massive. They hide this fishing location from outsiders. But there are still many other types of fish available that can be fished and consumed.

#### b. Forest Conservation, Stone Wall and Waterfall

The forest is home to the mainland Dayak tribe so that it is maintained. Forest conservation is done by harvesting forest products at predetermined times, such as harvesting rattan when the rattan rod is dead and the thorns are gone. Cut down the trees as many as needed to build a house or other facility. Establish sheltering houses along the path of Dayak tribes so as not to damage the surrounding forests.

Forest conservation also greatly affects to the supply of Mahakam river water. This is visible when entering a long dry season, waterfall discharge and river water is reduced considerably. As a result the beauty of the waterfall along the edge of Mahakam reduced or lost. The waterfalls are located on the left and right side of the river that has a variety of height with stone walls perpendicular.



Fig.6. Waterfalls, Bato Ten'fang Carst Stone Wall, speed boat on cascade. Source: KSPN Team 2016

On the Tering - Long Bagun shipping line, on the right side of the river is the limestone wall of Bato 'Ten'fang that became the graves of the Dayak kings in the past. Until now these sites are still honored and can be enjoyed from a distance. Indonesia establishes limestone walls including nature conservation sites.

#### c. Cascade

Along the Mahakam river between Tering and Long Apari there are 13 thrilling cascades (fig. . These cascades have different characters. In accordance with the provisions of the FAJI (Indonesian Rafting Federation), the cascade of the Mahakam River is not considered difficult. However, due to the character of the watershed and the use of the Mahakam river as a log carrier path, some fairly steep cascade becomes very dangerous because there are many logs trapped underneath and at times turned into a lethal batter or a deadly trap. Nevertheless this condition is quite challenging for enthusiasts sporting a challenge. Sport rafting in Indonesia developed by the son of Dayak, Sinarmas Jati. The first foreign tourists who rafting in Mahulu was Frank Morgan.



Source: Google earth and analysis, 2017

#### 3.5. Tourism

Mahulu District is currently in demand by tourists with special groups such as tourists with research interests, living with local people (homestay), exploring and enjoying exotic scenery, as well as testing guts through dangerous cascades. The number of tourist arrivals has not been recorded yet, but 3 hotels in Long Bagun with each capacity between 15 to 20 guests are almost always full not including guests staying in people's homes in villages along the river.

Tourists who visit the Mahakam Ulu region is mostly traveled up to the Long Apari located on the border of Malaysia. Some came to fish big fish in the upper Mahakam. While the rest visit the tourist villages and conduct research. At times of Hudog and Erau festivals, tourists come in large numbers. By 2015, 28 foreign tourists visit Mahulu, the lowest number compared to other districts in East Kalimantan (BPM, 2016). But still a few who follow the tradition of manugal, farming, rafting and so forth.

Figure. 7. The Cascades along Mahakam River at Mahulu.

Projected

Number of

Tourists

30539

32735

34931

37127

39323

41519

43715

48107

50303

t

1

2

3

4

5

6

7

9

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Month	2013	2014	2015	2016
January		1967	2143	2034
February	1	1635	2345	2134
March	1 24	1897	2112	2267
April		1456	2167	2023
May		1983	2289	2156
June		2013	2314	2089
July	1800	1978	2145	2456
August	2000	1994	2067	-
September	1986	1876	2156	
October	1956	1739	2089	
November	1768	1472	2054	1.1
December	1523	1746	1534	-
Amount	11.033	21.756	25.415	15.159

#### Table 1. Number of Tourist Visits in Mahakam Ulu District



#### Sumber: Team KSPN 2016

National tourism records comparison of natural and cultural resource based destination visits in Indonesia to Malaysia and Thailand in Table 2.

Table 2. Indonesia Tourism Competitiveness Index Compared to Malaysia and Thailand in 2016

No	Katagori	Indonesia	Malaysia	Thailand
1	Natural And Cultural Resources	17	24	21
2	Natural Resources	19	26	16
3	Cultural Resources and Business Travel	25	27	34
	O Deter	0040		

Source: Ratman, 2016

#### 4. DISCUSSION

The Apokayan Dayak tribes live in remote and difficult locations. The pattern of life is thick with the tradition which is maintaining the character of the Dayak tribe from bad outside influences. Its sustained traditions and natural exuberance encourage special interest travelers to explore the Mahulu.

Tourists will conduct research before deciding to visit a destination. Most tourists are interested in the theme and specificity of a destination that is featured in various media. At this point the impression is displayed becomes important because it is the identity of the area and will help build the positioning of the area. Mahulu District decided to lift the branding of "Exotic Long Bagun". This branding will encourage an increase in tourist visits as in table 2.

 Establishment of Natural Rock Tour Packages of Karst-Taman Budaya Rock and its transportation and transportation routes from Ujoh Bilang

In every tourism development in the Mahakam Ulu Watershed requires a provision that can be agreed by the Dayak tribe, Local Government and investors with the priority of conservation area and vital natural resources.

60000

50000

40000

30000

20000

10000

The development of land, water and air infrastructure is needed in addition to the provision of amenities. Education for tourism service providers in the major of language, transportation, hospitality, local cultural history and safety is needed. From this education is expected to arise the awareness of tourism in the community so that formed a community group driving tourism activities in each location. The development of a livable and worth selling area is a priority.

Mahulu needs a lot of entertainment and recreation organizers to help promote their owned destinations. Many investors want the opportunity to sell this Mahulu package primarily for natural and cultural based destinations. This challenge will help diversify forest and environmental exploration efforts for Dayaks encouraging growth in nature-based tourism. Tourism potential can be developed such as rafting and outdoor activities, homestay with life experience in Dayak tradition, gardening activities and fruit harvesting, enjoying geopark area and so on.

#### 5. CONCLUSION

C.

d.

Year of

Projection

2016

2017

2018

2019

2020

2021

2022

2023

2024

2025

Po

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The formation of tourism programs in the Mahakam Ulu watershed must be in line with the nature conservation that the Apokayan Dayak tribe has sought. Possible programs are:

- a. tourism emphasis
- Increased ability of tourism service providers to support sustainable tourism b.
  - Development and upgrading of sustainable amenities

Development :

- Establishment of outbound facilities, activities, and guides that can be new tourism activities.
- Establishment of traditional village cultural tour packages

Tourism Development in the Mahakam Ulu River as an Effort to Preserve the Culture and Ecology of the Region



#### Table 3. Projected Growth of Tourist Arrivals in Mahakam Ulu District

#### Sumber: Analisa Team KSPN 2016

Branding and promotion development at national and international level with sustainable

Rafting special tours package with equipment rental, guides, and tourist safety guarantees.

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Tourism Development in the Mahakam Ulu River as an Effort to Preserve the Culture and Ecology of the Region

Possible Factors Explaining Their Preference for Dry Rice Cultivation" in Borneo Buletin Vol 30,

# Transformation of irrigated agricultural landscapes along with urbanization and its impact to distribution of frog species in Sakai City, central Japan

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#### ABSTRACT

In this study, we investigated urbanization process and sequential transformation of farmland and irrigation channel management in Sakai City, central Japan, by constructing digital historic canal and farmland maps. Local historic archives and literatures were also used to support this analysis. In addition, we investigated anurans distribution in this area to reinforce our understanding of the urbanization effects into local ecosystem. As the results, we found that, although urbanization had brought canal network and farmland fragmentations, canal management organizations were able to get some merits including stable irrigation water use and considerable donations from urban side. Our anurans investigation showed that adaptation of anurans into urbanization with the expansion of dry rice fields and canal pavements highly depended on species.

Keywords: Urban Agriculture; Irrigation Canal Management; Farmland Use; Paddy Ecosystem; Anurans

#### 1. INTRODUCTION

Many Asian large cities including Japanese cities under monsoonal climate are situated on low-lying alluvial plains, and have inherent characteristics of land-use mosaic of urban land uses and farmlands, especially paddy fields. Such remaining farmlands could be considered as important urban agricultural places providing various ecosystem services including fresh food provision, landscape enhancement, disaster prevention, biodiversity conservation, and so on; therefore dynamic conservation measures were required. In Japan, 43% of the whole freshwater fish species and 79% of the whole frog species were observed in and around paddy fields (MAFF 2009), supporting a vital role of a rice ecosystem in biodiversity. Such a rice dominant ecosystem has been threatened by various socioeconomic factors including an aging issue, lower food prices and urbanization pressures. Moreover, ongoing expansions of non-environmentally friendly agricultural facilities such as concrete made U shape drainage pipes and land readjustment rice lots with spatiotemporally minimum water pooling have a serious influence in sustaining rice ecosystem with biodiversity.

Recently eco-friendly agricultural construction works and methods were highlighted; however, there is less number of studies examining an entire process of rice landscape transformation and biodiversity beyond individual eco-friendly project explanation.

As considering these points, this study focused on irrigated rice landscape in Sakai City, central Japan, and examined historical transformation process of farmlands and irrigation channel network. We also investigated sequential transformation of management methods and organizations for farm and irrigation facilities through interviews and investigations into local historical archives. Furthermore, we field investigated distribution of the current frog species as indicator species for urbanized rice landscape. Finally we compared these three results and discussed about problems of the current urbanization process and better future land-use scenarios and directions in consideration of biodiversity conservation.

#### 2. METHODS

#### 2.1 Study area

Our study area is located inside Sakai City in Osaka Prefecture, Japan (Fig. 1). This area is located in the urban fringe of Osaka metropolis, facing still expansion of urban housing together with farmland loss. The city government stated "Sakai City Agriculture Promotion Vision" (Sakai City 2017), and put some efforts on promoting local food system as maximizing remaining rice and dry fields. Because our study site is situated on relatively higher upland in the eastern fringe of Sakai City, its rice cultivation highly depends on irrigation facilities such as ponds and channels; hence city government has focused on improvements of these irrigation facilities. As for transportation, Kita-Noda train station was opened in 1914, and then urbanization proceeded around the station. Recently private cars are also major transportation modes in our study area; nevertheless the train station is still the core of urbanization. Thus our study site has long history of urbanization and urban-rural land-use mixtures, and has various water related landscape elements. Therefore, this site is appropriate to investigate relationships between landscape transformation and biodiversity using indicator frog species.

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2.2 Irrigation land-use mapping and document collections

We collected paper maps including detailed irrigation map at a scale of 1:3000 for 2014, 1:2500 topographic maps for 1978 and 1994, 1:3000 topographic map for 1961 from local municipal office and library. Then we used Google Earth pro (Google Inc.) and georeferenced scanned images of these paper maps by the image overlay function. We digitized farmlands (dry and rice fields), irrigation ponds and canal with an attribution of open or culvert as time series from these overlaid maps. Our newest digital map for 2015 was constructed based upon this 2014 irrigation map and ground validations during our field survey for frogs.

We also interviewed local officials at agricultural engineering division of Sakai City hall about transformation of irrigated landscape and water management agencies. In addition, we visited local libraries and collected local historical archives and documents describing landscape change and local land-use issues arisen from local people.

#### 2.3 Frog distribution survey

We selected frog species as indicators for evaluating urbanization impact into biodiversity of irrigated landscapes. It was because frogs are adaptive to both dry and wet land conditions, eat various insects, and are eaten by birds, snakes, and other living things, showing a core part within ecosystem pyramid. Moreover, it is easy to identify frog species by its sounds; hence it is appropriate to use them as indicators for evaluating rice dominant landscapes (Tempaku et al. 2012). Based on previous frog monitoring research in Osaka area (Senior Nature School 2015), we targeted the 8 species: Bufo japonicus; Hyla japonica; Rana japonica; Rana nigromaculata; Rana rugosa; Rana catesbeiana; Fejervarya kawamurai; Rhacophorus schlegelii (Fig. 2).

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We recorded frog sounds by smart phone (Xperia Z3 SO-01G) in accessible every rice lots and ponds in our study site between 19:30 and 21:00 on May 25, June 11 and 25, July 16 and August 5, 2015. These investigation dates were decided according to rice cultivation calendar in the site (Fig. 3).



Fig. 2. Our 4 indicator species (observed in our field investigation) among 8 target species. They show different moving and habitat characteristics. Photos were from Wikipedia.



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#### 3. RESULTS AND DISCUSSION

Figure 4 shows changes of farmland uses and water network in our study area. Our newest 2015 map was also overlaid with frog distribution in our field frog monitoring. Table 1 shows some numerical indices of irrigation landscape transition.



Fig. 4. Irrigated landscape transition and frog distribution.

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	1961	1978	1993	2015
Total drain canal (m)	1737	2267	2991	3945
Total open canal (m)	41381	36563	35279	25160
Total dry field lots	116	110	223	221
Average dry field size (m²)	1003.13	683.50	537.41	615.03
Total dry field area (m²)	116364	75186	119843	129772
Total rice field lots	749	455	501	270
Average rice field size (m²)	1646.98	1410.64	896.34	900.61
Total rice field area (m²)	1233593	641845	449067	243166
Total pond number	25	12	11	7
Total pond area (m²)	238440	213007	130622	108303

According to these maps and indices as well as our local interviews and document survey, in summary, about land-use change, first urban development by the train company proceeded and then land readjustment and major road constructions were completed by the government. As for water network transition, first local parents and polices asked water association to put a lid on the canal in order to avoid children accidents. We also found that canals were closed or changed in its routes when large-scale facilities such as subdivisions and schools were constructed.

About transformation of management organization for water and land, water association (in some districts land improvement association) indeed welcomed urbanization because they can get donation from the developer. Moreover, along with urbanization, water baseline volume increased due to urban housing (somehow treated by septic tank) wastewater, whereas water quality became worse (but can be used for rice). When water association gave up canal management due to further urbanization and aging, they had to return water use right to the city hall. Then urban facility division (not agricultural irrigation division) in the Sakai City hall became responsible for canal management as urban drainage channel (no longer agricultural facility even if its physical structure looks irrigation channel).

We were able to observe in the field 5 frog species (partly shown in Fig. 2) among our initial 8 target species. What we couldn't observe in our field were Rana japonica, Rana nigromaculata and Rhacophorus schlegelii, which were recorded in previous frog species list for Osaka Prefecture (Senior Nature School 2015). Rana japonica's breeding season is winter (around January), therefore this species highly depends on the winter water condition. Recent expansion of rice lots without water during winter season for easy land management might have significant influence in decrease of this species (Natuhara and Kanbara 2001). Our study site was not an exception. Rana nigromaculata needs year round riparian wet condition, hence its numbers have been decreasing in land uses with dry conditions (Senior Nature School 2015) like our study site (Fig. 4).

Table 1. GIS calculated indices for irrigated landscape

Rhacophorus schlegelii has suckers and can climb up vertical concrete wall. However, it also needs soft soil condition during overwintering and breeding (Ihara 1999); therefore it cannot adapt manmade concrete environment (Osawa and Katsuno 2000) like our study site.

Among observed 5 species, Hyla japonica was dominant and found in every rice lots (Fig. 4). This is because it has suckers and can climb up the vertical concrete wall. Moreover, the time length between hatching and transformation is short; hence it can avoid an impact of intermediate dry up of paddy fields (Fig. 3). Fejervarya kawamurai was also investigated in almost every rice lots (Fig. 4). Doi (2008) reported that it can climb up the concrete wall even if it has no suckers, supporting higher adaptation into our study site with concrete wall channel and intermediate dry up of paddy fields. Bufo japonicus has no suckers and breeds during early spring, but can adapt to urban relatively dry condition. Therefore, it was observed along open canal, and not observed along the drainage (Fig. 4). Future expansion of dry paddies with open canal fragmentations might have negative effects on existence of this frog. Rana rugosa overwinters as larva so cannot survive in dry paddies during winter and at intermediate dry up timing (Fig. 3). Therefore, it was observed only near to the main open canal with probably enough water level for survive and breeding during winter in the middle part of Fig. 4. Rana catesbeiana is a problematic alien species in Japan (originally introduced from North America as edible frog) and was found only in the pond (Fig. 4). This frog inherently inhabits year round water condition such as a pond in our study site.

#### 4. CONCLUSIONS

This study revealed that, although urbanization had brought canal network and farmland fragmentations, canal management organizations were able to get some merits including stable irrigation water use and considerable donations from urban side. Our anurans investigation showed that adaptation of anurans into urbanization with the expansion of dry rice fields and canal pavements highly depended on species.

In Japan, as entering depopulation and urban shrinkage in the near future, it is possible to use indicator species like frogs (adapting to our original irrigated landscape) for discussing land-use pattern and planning that could involve emerging vacant lots and abandoned farmlands/canals as potential sites for wet landscape restorations.

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## Preparation of Border Masterplan of Cikapundung River From Upstream to Downstream in Terms of Green Open Space Requirement

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#### ABSTRACT

City development is a logical consequence of the urbanization process. Population growth resulting from increased birth rate, or the phenomenon of urbanization, has a serious spatial impact on city life. As the demand for space needs In order to meet the needs of the settlement. So cause pressure on the surrounding area, Especially on riverbanks.

Bandung is the largest metropolitan city in West Java, as well as the Capital of the Province. The level of urbanization in Bandung is very high, this phenomenon causes various problems like Environmental, economic, social and other problems. One of the environmental problems occurred in the river border through the right in the middle of Bandung, Namely Cikapundung River.

In the upper reaches of the Cikapundung River there has been land conversion from the catchment area to residential and natural tourism. Then in the midst of exploitation of river border into a dense settlement that caused the narrowing of land and river water pollution due to domestic waste. While downstream by sedimentation due to low contour elevation plus waste from upstream and middle.

Based on these conditions it can be seen that there has been a land conversion that does not comply with regulations and potentially worse if not done in accordance with the planning of spatial planning. Therefore the authors began to collect the power of juridical data owned by central or regional governments, Cikapundung River database of related intansi, and conduct site survey. To analyze and answer questions how far to which the Cikapundung River can be saved and restored its function as a source of clean water and drainage center of Bandung.

Keywords: Riverbank, Planning, Green Open Space Requirement.

#### 1. INTRODUCTION

Bandung is the capital of West Java Province with an area of 16,729.65 Ha located at coordinates 6 ° 50 '38 "- 6 ° 58' 50" LS and 107 ° 33 '34 "- 107 ° 43' 50" BT. Geographically this city is located in the middle of West Java province, and is located at an altitude of  $\pm$  768 meters above sea level, with the highest point in the north with a height of 1,050 meters above sea level and the south is a low area with a height of 675 meters in above sea level. Bandung city surrounded by mountains, where there are more than 10 mountains around the city of Bandung with a distance of approximately 1 kilometer from the city of Bandung. Therefore, the morphological form of Bandung region can be likened to a basin. The shape of the natural expanse is a hollow basin with morphology in the north and the plains in the south. Administratively, the basin is located in five districts / municipalities, namely Bandung, Bandung Regency, West Bandung Regency, Cimahi City, and 5 District outside the administrative area of Bandung city.

Bandung Basin area itself is surrounded by Mount Tangkuban Perahu (West Bandung Regency and Subang) and Mount Manglayang (Sumedang Regency) in the North, Mount Jarian Mount, Mount Mandalawangi and Mount Kasur (Sumedang Regency) in the east, Mount Puntang, Mount Malabar, Mount Rakutak and Gunung Bubut (Kabupaten Bandung) in the south, and Bukit Kidang Pananjung, Mount Lagadar and Gunung Bohong (Kota Cimahi). In a regional morphology, Bandung City is located in the central part of "Bandung Basin", which has a broad dimension of 233,000 hectares. Bandung city flowed two main rivers, namely Cikapundung River and Citarum River and its tributaries that generally flows southward and meet in the Citarum River. With such conditions, southern Bandung is very vulnerable to the problem of flooding especially in the rainy season.

Cikapundung River located in the valley Cikapundung is one of the largest river that flows in the city of Bandung from North to South. Cikapundung River is a river that divides the city of Bandung through 9 districts covering 13 villages. Cikapundung River has a function and a very important role for the development of Bandung, because this river serves as a source of raw water for the city of Bandung. Cikapundung River area is defined as one of the Strategic Areas of the City which has strategic value from the point of interest of the function of environmental supporting capacity. Cikapundung River also has potential such as potential tourism area and rafting sport.

Tamansari district located in the middle area of Cikapundung River, has a winding river flow that is prone to erosion. If the problem is not addressed then it will trigger the possibility of flooding or landslides at any time and may endanger the people who live in the Cikapundung River border. Given the enormity of socio-economic activities that will continue to grow around the area, it is necessary to improve the quality of life of the community, especially the riverbanks as a public space that synergizes with settlement activities, cultural centers, and centers of social and economic interaction between people who live in Bandung.

#### 2. METHODOLOGY

Planning area is a river that serves as a drainage center of Bandung, which recently also used as waste water disposal households and factories. In the upper river area, farmers are responsible for pollution of this Cikapundung river. Because they dispose farm waste into Cikapundung River directly without doing the processing first. Therefore, it is necessary to plan in the processing of cattle waste into energy. The middle river area is a metropolitan city that looks shabby due to dense settlements and poor utilities. The thing to do in this area is to rebuild the district through the river Cikapundung with environmentally friendly concept and system. Starting from Building, Open Space, water, energy, waste processing, Transportation, and community. Local communities from local communities have done some activities in order normalization river Cikapundung. They cleaned the river from municipal waste. Therefore, the related community should be supported by all parties associated with the river Cikapundung

In the downstream area, floods occur in every rainy season, in addition to the lower mainland face of the water level, this flood occurs due to settlements built in river border. Water from this flood contains bacteria from domestic waste and factory waste that is bad for health. Therefore, the development of flats should be done for people living in the border of the downstream Cikapundung River. And make embankments to withstand rainwater runoff.

#### **3. AREA CONDITION**

#### 3.1 Geography

Cikapundung River Basin has area of 43,439.04 ha with critical land area of 3.865 Ha. The run-off in the Cikapundung sub-basin alone is 529.5 million m3 / year with sedimentation stack of 1,023,347 tons / year (source: environmental management of West Java 2010)

Cikapundung River is a tributary of the Citarum River has a total length of ± 38 km through the district. West Bandung on the Upstream. Bandung City In the middle of the River, and district Bandung on the downstream of the river. Cikapundung River in the middle to downstream areas across densely populated areas. In the river border is filled by approximately 1,058 buildings with a population of 71,815 soul / data in 2004 (source: public works water resources of west Java, 2004)



(source: environmental management of West Java 2011)

Cikapundung River has a catchment area upstream of 111.3 km<sup>2</sup>, in the center of 90.4 km<sup>2</sup> and downstream area of 76.5 km<sup>2</sup>. Cikapundung river receives more than 2.5 million liters of waste per day, most of which comes from household waste. (Data environmental management of Bandung-Indonesia) The number of residents who reside in the planning area is 221,944 people with 70,386 Family Heads. While the highest population is in Tamansari District29,996 people with 7,818 Family Heads. there are about 1.058 houses located near the banks of the Cikapundung River

Cikapundung River flows through protected forest area in Cibodas Village, Lembang District, West Bandung Regency. Further stream flow to the Park Protected Forest area IR.H.Djuanda Dago Pakar. Then the river flow downstream through the settlement of the population that starts from Babakan Siliwangi street until finally empties into the Citarum River.

#### Preparation of Border Masterplan of Cikapundung River From Upstream to Downstream in Terms of Green Open Space Requirement

Figure 1: river cikapundung arrangement plan

#### 3.2 Ecology

In the upstream ecological area is still functioning well, but lately has built many tourist attractions that sell beautiful scenery of pine forest. Upper area is a protected area guarded by the Indonesian forestry service. In the transition area between rural and urban ecology the river's ecological function has begun to decrease. In this area more buildings are found rather than trees, which is bad for mammals, birds and other animals. The urban area of the city government of Bandung began to revitalize on this riverbank. The result is a water front spot at some point in the river Cikapundung. But in the downstream area water front spots are rarely found.



Figure 1: Map of Cikapundung Sub-Basin (source: BPDAS Citarum Ciliwung - BPS 2010 Kemeterian Public Works - Basemap Esri 2012)

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#### 3.3 Social, Economic and Cultural

In the upper reaches, the majority of the population live as vegetable farmers and dairy farmers. In the central region the majority of the population is a trader, and a businessman. While in the downstream area the majority of the population work as traders and industrial employees.

The religion held by the people along the Cikapundung River is Islamic and Bloody Sundanese. Evidenced by there are several mosques along the river cikapundung with no other houses of worship found.

#### 4. Planning

Planning is done by dividing the three zones is upstream and downstream. For upstream areas it is necessary to educate the local community about the importance of maintaining the river and the dangers of water pollution by the waste of farmers, therefore the community should be provided facilities that support the program, such as making biogas facilities. Subsequent planning is carried out in the central region where this zone is an urban area. In slum areas need to be rebuilding from the building, utility, sanitation and other supporting factors that is:



Green Planning and Design Α.

Eco-friendly planning with adjustments to RDTR Bandung

Β. Green Building (Energy Efficient Building)

> Given the data of BPN shows that the Cikapundung River border has a variety of ownership status, the handling will be divided into two, namely:

- Private land i.
- ii Land owned Goverment City Bandung

The settlement is built vertically according to the plan of Bandung City Government which is equipped with drainage system and communal recharge wells to minimize urban water supply to the river, and increase the ground water reserve of Bandung City.

- C. Green Open Space (Provision of Green Environmental Open Space) Strategy to improve the quality and quantity of Green Open Space according to the characteristics of the planning area with the target meet the needs of green space 30% Environmental parks will be built in accordance with the required site conditions and functions such as: socialization facilities, recreation, mitigation, evacuation, tourism and environment-based education. Environmental parks are built as a boundary between settlements and rivers, equipped with inspection lanes and Temporary landfill, to optimize the mobilization of river treatments and their borders.
- Green Waste D.

Strategies to get zero waste by implementing the 3R principle of reducing waste, recycling waste, reduce waste

Green Water E.

> Efficiency of water resources utilization and prevention of water pollution in Tamansaris District and Babakan Ciamis.

Green Energy F.

> Utilization of energy sources that are efficient and environmentally friendly by utilizing the sun and river flow Cikapundung.

- G. Green Transportation Development of sustainable and eco-friendly transportation system such as bicycle and pedestrian path.
- H. Green Community

Caring and active participation of environmental community in developing green city attributes The environmentally friendly community should be facilitated by the government of Bandung City for the realization of the spirit to keep clean the Cikapundung River.



Figure 3: Border Plan of River Central area of the city (Source: Bandung spatial planning office)



Figure 2: Map Zone Planning Area (Source: USGS and Bakosurtanal ArcGis esri)

Preparation of Border Masterplan of Cikapundung River From Upstream to Downstream in Terms of Green Open Space Requirement

#### 5.Conclusions

Arrangement of riverbanks Cikapundung can not be done by some areas or some parties only, but must be accompanied from upstream to downstream. This program should be carried out by government, community and other relevant agencies. Thus the river cikapundung will be able to function as it should be.

Upper river area serves as a rainwater absorption without any agricultural waste into the river. The central area is a beautiful, comfortable, neat urban waterfront with no slums. And the downstream area becomes an area free of floods in the rainy season and water pollution from waste containing bad bacteria.

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# Urban rivers space regeneration, should we keep it for people or let it go with nature

#### ABSTRACT

Rivers have an important significance when it comes to the history of humankind urbanization, among all kinds of waterfronts they are most integrated in city fabric and connected to people lives. When the idea of regeneration surfaced in the past years it was the answer to solve core issues that led to the degradation of these rivers among other water bodies across the world, as many cities and communities harnessed the outcomes and benefits of riverfronts regeneration, nature also gained back some of it's balance by enhancing the ecosystem of these rivers using different approaches and practices without depriving people from this new space that was created. In this paper we will shed the light on selected case experiences from around the world that managed to achieve a successful regeneration of their riverfronts that comes with great impact on the environmental and ecological condition of the river taking the Nile of Egypt as a case study due to its great significances as the key role player in creating of one of the first civilizations of the world and now as the main source of water for Egyptians, assessing it's environmental condition that degraded over the years, especially in Cairo the capital, and coming up with framework that integrate the riverfront regeneration process with the upgrading the ecosystem using new eco design approaches and methods that at the same time could let people enjoy the riverfront space again.

Keywords: Riverfront, Regeneration, Nile, Ecology, Cairo

#### INTRODUCTION

The vital role that rivers play in the history of cities is well illustrated in much literature works either if it was hydrologic, biological or cultural role (Kondolf & Pinto, 2016). Aside from being a main source of water and food (Findlay and Taylor, 2006). Urban Rivers have an important role in connecting communities to nature through landscape and that's why most urban centers were positioned around rivers (Everard & Moggride ,2012).

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The waterfront regeneration wave emerged in the 70s in North America and spread out to every corner of the globe afterwards. (Gabr 2004) When economic, social and environmental problems became more identified, regeneration plans were directed to reattach people again to the water edges, re-inventing a desired public space and restoring environment once again. (Attia & Ibrahim, 2017) as a result Many opportunities were harnessed of different kinds of waterfront regeneration projects, economically it gave the city a new asset to attract tourism and promote a selling new image (Smith and Ferrari, 2012), which all reflected in providing more jobs and public/private investments that contributed in enhancing and developing the overall urban quality. (Smith, 2006), also enhanced the environment in aspects like water quality and infrastructure improvement in addition to preservation of historical heritage. (Jones, 2006)

#### CHALLENGES FACING URBAN RIVERS

Urbanization caused alterations for rivers systems (Moggridge & et al., 2014). Rivers straitened and contained which affected severely their special ecological value and wild life. This case is common to any urbanized area due to the rapidly rising population. (Lawton, 2007). The excessive usage led to more challenges like sewage, industrial discharge, road pollution and fertilizers. Civilization serve human well but on the other hand degrades the ecological function of a river (Wantzen &et al 2016). In fact it is ecological statue is fading away faster than any other natural system on earth. That threat 80% of world population (Cengiz, 2013).

### **ECO-DESIGNED RIVERFRONTS**

Even in urban context relatively natural river channel still exist and can be enhanced or restored to more natural conditions simply by simulating the slope, vegetation, appearance and ecological function of a natural bank, which lead to reestablishing native riparian that stabilize banks providing wildlife habitat.(Otto &et al 2004). it is proven that using biological materials and reducing area of concrete is cost effective .it sustain the natural ecology in an atheistic way (Lei & Guanghu, 2010) however, Restoring ecology doesn't necessarily mean imitating natural look but it aims at enhancing ecological conditions as much as possible with maintaining human role and activities (Vollmer, 2009).

#### PUBLIC PERCEPTION OF ECO-DESIGNED RIVERFRONT

Eco-designed riverfronts have indirect benefits that affect the urban resident's guality of life like recreational activities, microclimatic improvements in air quality and reduction of urban heat island effect (May 2006). That's why the river ecosystem notion must be put in front of the public eye by education like ingenious designs that let people watch up close the eco cycle Interpreted with culture cues and landscape to let them comprehend place.

#### ECONOMIC BENEFITS VS ECOLOGIC VALUES

The growing of waterfront regeneration initiatives because they focus on the economic agendaand it's revenue could give the city an economic push (Niemann & Weber, 2013), the aim could be investing in degraded area (Jauhiainen &, Jussi 1995) or integrating multifunctional contemporary approach in city core that allows multi uses from leisure to retailing boosting urban tourism that consequently attracts visitors, jobs and income. (Kostopoulou, 2013) resulting in ongoing debate about conflicting social, economic, and environmental interests, while Highly developed communities, managed to improve urban river quality. Developing countries' facing much urging needs to provide basic services for rapidly growing populations and to push the economic wheel. (Vollmer, 2009)

#### METHODS

The research team reviewed official reports from 2010 till 2017, previous studies and academic research related to Nile waterfront .survey study from April 2015 to March 2017 including one by one interview with stockholders (residents, officials, professionals and academics).

#### THE NILE IN CAIRO

Cairo Has been a political, Cultural, Religious and Commercial Capital through Egyptian history (El Zafarany, 2011), one of the top dense cities on the globe with over than 9.5 million in habitant (CG,2017) situated on the east Nile bank and part of the greater Cairo region which consist of another two governorates. The river travels 76 km in it (Abo Elfetoh, 2017).

#### ENVIRONMENT CONTEXT

The fertile soil of Nile allowed flora diversity to be present in cairo (Avendaño & El Gamal, 2009) Among 87 kinds represent 49 species. Nile fauna includes endemic kassas toad and square marked toad, 122 kinds of birds like black shouldered kite, common bulbul and graceful walber, 31 kinds of mammals and reptiles like striped weasel, Egyptian mongoose, the Nile Rat and flowers shrew. (Hoath , 2009 ,NRBA, 2009) The high population overused the ecosystem services in Cairo and the unplanned urban sprawl created huge barrier to vital biological corridor existed on the Nile banks (Avendaño & El Gamal, 2009).

#### ENVIRONMENTAL PROBLEMS

The Nile was subjected to many causes of pollution; agriculture discharge, untreated sewage, increasing discharge of industrial effluents, wastewater disposal, pesticides and fertilizers, oil spills and waste or animal carcasses disposed from Nile boats(Mohamed & et al., 2013). Causing a decrease in mammal, bird, fish, and reptile biodiversities. Raptors like lesser kestrel, bird species like white-tailed sea eagles and lesser flamingo. Mammals like snipes and shrew (Abdel-Meguid, 2017); fish speices were dropped to only 13 speices in cairo (Said, 2013).



Source: EEAA Report 2016

In a recent study conducted by indicators showed that pollution severely affected the water quality, aquatic life and the river ability of self purification, all due to the causes mentioned above (Abdel-Satar & et al.2017). In Cairo the numbers of industries and agriculture drains contribute significantly to the Nile pollution rate as shown (EEAA, 2017). High rate pollution in water quality above limits, the government is spending more money and efforts to reduce negative impact on the Nile but still remains above limits.

Year	2010	2011	2012	2013	2014	2015
DO	7.1	7.0	7.1	7.2	6.9	6.5
BOD	2.6	3.6	2.9	4.5	6.5	8.5
COD	11.6	12.8	13.3	13.4	19.0	19.1

Table .1 Annual averages of water pollution indicators in Nile River Cairo Unit: milligram/ L Source: EEAA Report 2017

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Year	2010	2011	2012	2013	2014	-
Smoke	50.00	57.10	96.50	63.54	56.00	-
T.S.P	476.30	464.00	462.00	485.35	498.00	
So2	13.00	12.20	10.20	13.00	11.00	

Table .2 Annual averages of air pollutants in Cairo / Unit: Microgram/m3 Source: EEAA Report 2017

#### **URBAN CONTEXT**

Cairo governorate consist of 38 districts 11 that directly overlook the Nile banks from south to north; Tebin, Helwan, Maasara, Maadi, Dar El Salam, Old Cairo, West of Cairo, Bulag, Rod El Farag and El Sahel (CG, 2017). Each district has its special urban pattern and demography Table (3) divides them into zones according to Location, Urban pattern theme, Land use and Social Character.



Fig .2 Cairo Waterfront Zone map Source: Author

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#### **ZONE 1 (SOUTHERN CAIRO) HELWAN**

It is a part of Old Cairo was known for gardens and hot springs, since 50's government major plants and industries took place and expanded in the area, now main industries are cement (CG, 2017), cars and steel next to it is the workers housing, down to the south is home to marble industry taking the third place worldwide in between with vast green vacant former farm lands.

#### **ZONE 2 MAADI**

Emerged in the early 20th century as extension of Cairo on the west bank Recognized as a patch of green in the eastern bank of the Nile dates, have special planning pattern, still consist of the elite class and is the least dense populated among other districts. Waterfront land use is commercial and residential with 20 floors average height. The river banks are developed into recreational uses, nurseries and private uses.

#### ZONE 3 OLD CAIRO @ DAR EL SALAM

The historic district which contain most of t he Islamic and Coptic architecture and Rawda Island as it goes down to the south to Dar El Salam District which was established partially on agriculture lands and is considered to be one of the highly dense populated area in Cairo, so it's considered as informal seatlment(CG, 2017).

It contains middle class residential, educational and touristic buildings. Average heights: four floors (Kondolf & et.al, (2011).narrow sidewalks and the river banks are rarely accessible and vegetated with nurseries and social clubs.

#### ZONE 4 (WESTERN CAIRO, BOLAQ) CBD

CBD which is economic, political and social heart of Cairo with important land marks include Tahryr square, the Egyptian National Museum, the Egyptian Television and Radio building ,kadive Cairo core ,high profile Zamalek Island and garden city sub-district, the area is congested vital hub for commuters who come for work and leisure with higher levels of noise and traffic jams. Waterfront uses are administrative, commercial, and touristic uses and to the south in garden City uses are embassies, hotels, and upper-class residential with special suburb planning pattern, average heights 13 floor (Kondolf & et.al, (2011). Small sloped concrete banks with promenades in some areas and ferry stations

#### ZONE 5 (NORTH CAIRO) ROD EL FARAG AND SAHEL

Bolag is a congested district filled with small scale industries, mixed classes population, historically linked to the Nile by Boulag port, Rod El Farag and Sahel at the northen entrance of the city, most inhabitants came from rural areas to settled in for vegetable trade the area used to be agriculture land, the Waterfront lacks of any recreational uses and degraded banks conditions (CG, 2017).

#### Table .3 Zones Urban Context and Problems

Zone	Waterfront Length	Theme	Waterfront uses	Problems
1.Helwan	20.6 km	industrial	Informal housing	Sever pollution ,Neglected waterfront
2.Maadi	2.9 km	Western style suburb residential	Recreation, commercial and mixed uses	Lack of public access
3.Old Cairo	8.4 km	historic	Administrative, residential	Inaccessible narrow
4.CBD	12.8 km	Down town	Administrative, commercial, touristic	Traffic conjunctions
5.North Cairo	3.5 km	rural	Residential, mixed uses	Degraded waterfront banks

#### SOCIAL CONTEXT

Cairo Population according to government static reports from 2010 to 2017 shows that 26% of Cairo population lives in districts on the waterfront, with 50% male 50% female ,26.1% under the age of fifteen,60% ages between15:40, 85% educated, The per capita income is 2748 \$/Y (UN 2015) unemployment 15 %( CAMPAS 2017)

Neighborhood	Pop
Tebin	8909
Helwan	3758
Torah	1135
Maasara	4069
Maadi	9653
Dar Elsalam	5131
Old cairo	2629
West of cairo	3272
Bulag	8572
Rod Elfarag	1738

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#### rhoods Population AS Report 2017

ion	Area
	431.00 km2
	96.116 km2
	126.780 km2
	27 km2
	126.000km2
	75.000km2
	19.240km2
	7.300km2
	5.590 km2
	5.200 km2
	10.600 km2

#### DISCUSSION

On the waterfront the city urban pattern acts as a mosaic of different contexts and functions Varies between the CBD core, industrial zones, recreation and high rise, old historic Cairo and high density informal areas all pressing on the Nile ecosystem, in a city where person share of green space is 1.5m2 despite of the existence of Nile fertile corridor (Clark, 2016). Survey study showed that main problems residents are facing are pollution, heavy traffic, lack of accessibility, lack of public recreational and green spaces. Table (5) shows Challenges, locations and proposed solutions with lessons from international experiences.

Reducing pollution could be by planting pollutants absorbent plants (Mohamed & et . al, 2013), restoring flood plains that could increase air quality by 30% than street level( Kondolf & et. al, 2013), implementing floating purifying islands approach (Redeker & et. al, 2013) like Cheonggyecheon stream project that reduced noise, and pollution level and increased water and air guality (Newman & Matan, 2013)

Since Egypt is a developing country, economically it cannot afford regeneration project costs, land value along the waterfront is an important asset could cover project costs ,land value reaches average 3000 \$/m2 (Ahram 2017), real estate value 500:600 \$/m2, making revenues, taxes, job opportunities and environmental improvements.

Developing administrative system includes laws, punishments, monitoring programs and solving conflicts between authorities will be needed to create new vision of sustainable development (Mouad, 2013). Public awareness of environmental culture and history, implementing landscape architecture programs is key factor of culture change in this issue.

Waterfront recreation strategy must consider various solutions for different zones according theme. The industrial zone in Helwan was recommended to be removed to the south east (Hashim 2005). Houtan Park project in shanghai using pure landscape approaches to solve water issues on site, basically managed to recreate wet lands, flood control measures and introducing urban agriculture, planting pollutants absorbent species, increased biodiversity with 93 species of plants and over 200 species of animals observed (Saunders, 2013). These results made the Chinese government use same approach in many projects (LPS.2017).

The historic old Cairo zone has hidden touristic values with proper planning of connecting heritage sites with waterfront among the regeneration plan ,could upgrade the degraded urban conditions of the neighborhood and boost economic out comes (Sutton and Fahmi 2002).

#### Table .5 Waterfront Challenges, locations and proposed solutions

challenge	zone	Proposed solutions	Successful examples
Air pollution	all	Industrial zone filtration or relocation, more planting, decrease traffic flow	Cheonggyecheon stream
Water pollution	all	Monitoring programs, restrict laws and punishments, more awareness through media ,introducing eco-friendly technologies and eco-landscape approaches	Houtan park, Cheonggyecheon stream
Noise pollution	CBD	Decrease traffic flow, use more landscape approaches	Cheonggyecheon stream , Madrid rio
Fragile Biodiversity	all	restore planting and animal species,	Cheonggyecheon stream, Houtan park
Lack of green space	CBD ,Old Cairo, Northern Cairo	Put comprehensive planning process for green spaces distribution, planting the right plant in the right place	Madrid rio, Cheonggyecheon stream
Heavy Traffic Waterfront problems	CBD , Old Cairo all	reuse and expand ferry stations to Use Nile as alternative traffic hub, increase means of public transport, underground tunnels New vision of regeneration plan considering public accessibility, atheistic values, recreation activities, environmental conservation with public/private/experts involvement	Madrid rio, guangzhou pearl river waterfront, Istanbul water tram Madri rio, Cheonggyecheon stream, Houtan park
Economic problems	all	High revenue projects to urban regeneration	
Education problems	all	Develop landscape education spreading awareness in the media	

#### CONCLUSION

It's a fact that The Nile waterfront suffers from the booming population in Cairo another fact that Cairo itself suffers from lack of green spaces, so the eco-system of the river and the city is highly disturbed. Riverfront regeneration scheme could be a very effective economic tool to enhance the river environmental condition as proven to be in many countries.

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Also Eco-design approaches are globally well received in contemporary waterfront projects but in order to produces human / environment friendly riverfront spaces comprehensive intervention long term plans must be implemented involving all stakeholders and decision makers through the design phase. Developing the complex pattern of Cairo Nile front must consider the socio-economic characteristics, inhabitant's needs and ecological statues of it.

Egypt is on the verge of water scarcity crises, there is no way to prevent it so enhancing water resources, uses and quality is a priority and new approaches are needed.

It could be unrealistic to carry out Mega waterfront projects in a developing country like Egypt however Cairo deserves a chance to achieve economic prosperity by capitalizing forgotten city assets.

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Urban rivers space regeneration, should we keep it for people or let it go with nature

# Possibilities and issues on evaluating the ecosystem services by InVEST at local scales A case study of Kinki Metropolitan **Region Japan**

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#### ABSTRACT

In this study, we conducted ecosystem evaluation using InVest for both local and regional scales in the Kinki Metropolitan Region Japan. We compares between the results of these two scales, and discussed advantages and disadvantages of these two scales for planners. As the results, it was revealed that most of the lands with the high level of habitat degradation are located in the boundary between urban and mountainous area. And the evaluated scores of each grid in a regional level is not usually correlated with the scores at the local level. Moreover, we identified that small-scale isolated speculative lands within cities were given higher habitat values. It was also suggested that parameters selection might have an influence in this result.

Keywords: Ecosystem Services, Urban Green, GIS

#### **1. INTRODUCTION**

Green spaces play an important role for both humans and wildlife. Humans derive many essential goods from natural ecosystem. It is highly important to conserve these green spaces for a sustainable ecosystem services.

Recently, various researches have been conducted to identify and evaluate the ecosystem services for both global and regional level. There are several tools that have been developed in order to evaluate the value of the ecosystem services by distribution pattern of green spaces. The distribution pattern of green spaces correlates with ecosystem services at global or regional scales. However this may differ at the local level especially on a biodiversity perspective. This issue should continue to be discussed for a better evaluation of ecosystem services at local level.

Regarding these points, we have estimated the relative level of habitat degradation on the current landscape at regional and local scale in the Kinki Metropolitan region using by InVEST ver 3.3.3.. It is an open source software models developed by National Capital Project in order to help decision-makers incorporate ecosystem services into a range of policy and planning.

Mapping and visualization can be valuable for consensus building and decision making among various stakeholders. In particular, it is important for planners in governmental bodies to understand not only core conservation areas within their administrative boundary but also land-use and ecosystem patterns of their municipalities in comparison with other municipalities (Sherrouse et. al, 2011).

This study examines ecosystem evaluation using InVest for both local and regional scales, and compares between the results of these two scales. Then we discuss advantages and disadvantages of these two scales for planners.

#### 2. METHODS

#### 2.1 Study area

Our study area, the Kinki Metropolitan Region, is located at the center of Japan (Fig. 1). Kinki Metropolitan region constitutes one of the major economic cores of Japan and includes the Kyoto and Osaka that have been the heartland of Japanese culture since ancient times. Total population of this region is approximately 8 00 million. The total area of this study area is approximately 13000km2, and is covered mainly by forest (54% of the total area). Other land uses include built-up areas, paddy fields, other agricultural lands, bare land, and water (Table 1). The elevation of this area ranges from 0m to 1124m above sea level.



#### 2.2 Methods

We use InVEST Version 3.3.3 released on 3/3/2012, which has been developed by the Natural Capital Project, InVEST (Tallis et al., 2011), in order to evaluate to identify areas for protecting habitat quality and ecosystem services in the study area.

In various previous studies (e.g. Polasky et al., 2011, Goldstein et al., 2012), this model has been applied to evaluate the impacts of changes in land use on ecosystem services and to support land-use development planning. However, only a few studies applied this model in Japan (e.g. Kabaya, 2014, Shoyama, 2015).

We calculated the score of the habitat quality and level of habitat degradation using past and current land use data at regional and local scale and investigate their corresponding relationship. We showed the data and its source for calculating each ecosystem service in Table 2. The input data used in the InVEST model were predominately obtained from government authorities, and previous reports. We used ArcGIS10.2 and SPSS22.0 software for our analysis.

#### Table 1 Ratio of each land use type in this study area

Land use type	1976 (%)	2014 (%)	land use change(%)
Paddy field	11.3	7.2	-4.1
Agricultural land	3.3	3.2	-0.2
Forest	55.2	54.6	-0.6
Bare land	1.4	0.6	-0.8
Built-up area	8.7	14.5	5.8
Traffic land	0.7	1.2	0.5
Other public facilitie	3.7	3.4	-0.3
Water area	3.2	3.4	0.2
Beach	0.0	0.0	0.0
Sea	12.5	12.0	-0.5

#### Table 2 Input data and data source for InVest model

data	year	Resolution	data source
Region scale			
Land use	1976, 2014	100m grid	National Land Numerical Information Japan
Threat source map	2014	100m grid	created from landuse map in 2014
Local scale			
Land use	1974, 2008	10m grid	fine numerical information
Threat source map	2008	10m grid	created from landuse map in 2018

#### 3. RESULTS AND DISCUSSION

#### 3.1 Regional scale analysis

Figure 2 shows the resultant map of our regional scale analysis using 100m resolution land-use data set.



Fig.2 Map of habitat quality value identified using InVest at regional scale.

In this map, value 0 means completely artificial land uses including built-up area and road with lowest habitat guality, and value 1 means natural forest and farmlands with highest habitat guality. More than 70% of the whole lands showed value 1, and almost 20% of the lands were value 0. This might be because of strong influence of the sea and forest that were originally given higher habitat values in InVest. Nevertheless, fragmented habitats in the urban core of Osaka revealed value 0.67, supporting the basic trend of higher value additions in InVest model.

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Figure 3 shows land fragmentation index based on the current land-use types. It indicated that fragmented land-use patterns with higher value were situated in the urban rim facing hill and mountains. This area is the current forefront of urbanization over the farmlands, and urban-rural land-use mixture is proceeding (Hara et al. 2013).



Fig.3 Map of relative level of habitat degradation identified using InVest at regional scale.

#### 3.2 Local scale analysis and scale comparison

Figure 4 shows our local scale analysis around Sakai City (central part of Figs. 1-3) using 10m resolution land-use dataset (Table 2) together with the resultant map of our 100m resolution regional scale analysis for comparison.



Fig.4 Map of habitat quality value identified using InVest at local scale.

These maps indicated that when we focused on local scale, overall accuracy and spatial patterns were relevant. In fact, the average value of 10m resolution cells within each 100m resolution cell was equivalent to the value of its 100m cell (r=0.68, p<0.01). This indicated that 100m resolution analysis using InVest was enough for planners in each municipality to understand the habitat patterns and prioritize conservation areas within their municipalities. In Japan, 100m resolution land-use dataset was usable for the whole national lands, thereby supporting the advantages of this data use.

However, when we focused on urban area in Fig. 4, we can identify fragmented but high value habitat in 10m resolution. It means that simple application of regional scale results with 100m resolution might not be reliable to conserve isolated urban green habitat, whereas suburban and rural farmlands and forests were given higher values toward conservation. Sampei and Hara (2014) reported that there were important urban greeneries in private residential lots, which were excluded from 100m resolution result in Fig. 4. In urbanized municipalities, it is necessary to use higher resolution dataset such as 10m we used and to consider land covers within each land use. This is particularly the case of Japanese and other Asian cites with small scale urban-rural land-use mixtures as inherent phenomena in the context of historical geography, which might be out of the focus of InVest developers with focus on large-scale territorial wilderness like land management.

We also identified isolated abandoned lands with higher habitat value as 0.7 in the urban area. Such lands were visualized in mapping process as high conservation value lands, whereas sustainability of these speculative vacant lands was indeed not so high. InVest is useful model with requirements of limited numbers of spatial layers. However, these layers and parameters must be decided by specialists with sufficient local scientific knowledges. We need further case studies focusing on applicability of InVest and other habitat models for various landscapes and spatial scales including Japanese Cities mixed with Satoyama environment.

#### 4. CONCLUSIONS

This study revealed that most of the lands with the high level of habitat degradation are located in the boundary between urban and mountainous area and the evaluated scores of each grid in a regional level is not usually correlated with the scores at the local level. It was suggested that there were not much differences between those two scales.

Moreover, we identified that small-scale isolated speculative lands within cities were given higher habitat values. It was also suggested that parameters selection might have an influence in this result. Consideration of vegetation type or management practices in addition to land-use change, can provide additional options for improved performance.

In this study we focused only on habitat quality; however, InVest can handle other ecosystem services including CO2 storage, water purifications, pollinations, and so on. Future case studies will include such services as well as scaling issues we identified in this study.

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Ecosystem Services, Biodiversity and Returns to Landowners: A Case Study in the State of

J., Cameron, D., Arkema, K., Lonsdorf, E., Kennedy, C., Verutes, G., Kim, C.K., Guannel, G.,
# Rationalizing The Energy Efficiency and Carbon Impact of Materials in Landscape

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### ABSTRACT

The profession of landscape architecture is usually known as a "Green Profession" but what remains unknown is the impact of material used in design of outdoor spaces generally distinguished into two categories, softscape and hardscape. The softscape elements are composed of plant material and hardscape is the different types of materials used in the design of any outdoor space.

A general comprehension of Embodied energy & Carbon emissions for various materials utilized as a part of the landscape design were examined and the volumetric component of materials has been noted, which along these lines comprehended the Energy segment and Carbon segment of every material later the locus of the research moved crosswise over to see how carbon mitigation process can be started. Alternative building materials and carbon offsetting through planting at the site were two measures recognized to adjust the carbon emissions produced amid the specification of materials in a given project.

The carbon footprint studied under the scope of this paper is to run a reality check to understand how sensitive is our approach in the context of the carbon emissions that are being released during the construction time of the project. The intent of this paper is to understand how can we mitigate the impact of the project in the same project over a period of time, which is a fourth dimension to the scope of the landscape. If each project starts building a sensitive approach and integrates this concept, the difference which we would create is going to enrich the profession.

Keywords: Materials; Carbon Emissions; Embodied Energy; Alternative Building Materials & Carbon Sequestration.

#### 1. INTRODUCTION

The process involved in specifying hard materials create an impact at the source, the altered landscapes have been creating an impact on the flora, fauna and associated process. The identified negative impact of specifying materials and its direct relation to the carbon emissions.

The traditional materials used in any project are cement, steel, bricks, Aluminum and locally available stone are energy intensive and transported over great distances. Many landscape architects consider that they are helping to reduce the impacts of environmental change, indicating planting, which assimilates carbon dioxide. What is not known is how much that planted segment of an executed landscape design may balance the ecological and carbon effect of the hard materials that are utilized.

#### 2. VOLUMETRIC COMPONENT OF MATERIALS

Landscape projects have been analyzed as a part of this research and volumetric of materials used in these projects has been noted to understand the impact of these materials.

# 2.1 Volumetric of Material in Case 1 (Residential Project)

Site area: 4679 sqm Ground Coverage: 666.5 sqm Net Landscape Area: 4012 sgm

Table. 1. Materials used in Case A represented in m3.

S.no	Material	Quantity(Cubic Meter)
1	Soil	645
2	Brick	42.5
3	PCC	83.8
4	Stone	10.98
5	RCC	1.51
6	Kerb	29.8
7	Paver Block	64.75

# 3. ENERGY COMPONENT OF BUILDING MATERIALS

There is a great concern in decreasing the greenhouse gas emissions into the air with a specific end goal to control unfavorable ecological effects. Bricks, cement, and steel are the three noteworthy contributors to the energy cost of construction. With a specific end goal to lessen reduce indirect energy use in a building, either alternative for bricks, steel and cement must be found or vigorous energy conservation measures in these fragments of industry must be initiated.

## 3.1 Calculating Embodied Energy

The embodied energy in buildings represents the non-renewable energy devoured in the securing of raw materials, their production, manufacturing, transportation to site, and construction.

This initial embodied energy has two components: Direct energy the energy used to transport building products to the site, and then to construct the building; & Indirect energy the energy used to acquire, process, and manufacture the building materials, including any transportation related to these activities.

For calculation of Embodied Energy, this formula is used "Embodied Energy of Material (MJ) = Weight of Material in kg X Value of Embodied Energy in MJ/kg" (Rohit Deshmukh, 2014, Pg 61)

1. Volume of the total material used is calculated

2. Multiply Volume with density to get weight of the material

3. Finally, the Embodied energy per unit weight of the material is multiplied by the weight of the material.

Table 2. Embodied Energy of Materials in Case A.

S.no	Building Material	Case A (Qty - cubic meter)	Embodied Energy (GJ/kg)
1	Soil	645	56.43
2	Brickwork	42.5	280.5
3	Sand	101	70.59
4	Aggregrate	97.6	27.4
4	Stone	594 sqm	109.8
5	Cement	293	3984.8
			4500 50

4529.52

# 4. CARBON COMPONENT OF BUILDING MATERIALS

The term 'embodied carbon' alludes to the GHG emissions (communicated as carbon dioxide equivalents -CO2e1) that happen amid the processes involved in the development of materials and parts, and additionally the development procedure itself and end of life parts of the building. The carbon footprint of a material from sourcing, manufacturing, and transport to site is called as Embodied carbon is calculated for a product/material while carbon footprint is measured in terms of a process like operation of a building.

## 4.1 Calculating Embodied Carbon

Embodied carbon is usually expressed in kilograms of CO2e per kilogram of product or material. The majority of building materials data for Embodied carbon can be found at Inventory of Energy and Carbon (ICE) database developed at the University of Bath.

#### Table 3. Embodied Carbon of Materials in Case A

S.no	Building Material	Case A ( Qty - cubic meter)	Embodied Carbon (Tonne)
1	Soil	645	35.4
2	Brickwork	42.5	13.1
3	Sand	101	1.2
4	Aggregrate	97.6	1.17
4	Stone	594 sqm	1.4
5	Cement	293	585.2
			637.47

# 5. MITIGATING THE ENERGY & CARBON IMPACT OF BUILDING MATERIALS

Fig. 1. Volume : Energy : Carbon Component of Materials in Case A



The inferences from analyzing Case A, The quantites of materials with higher carbon emissions needs to replaced with alternative solutions and the quantities of materials which cannot be avoided has to be replaced with other measures.

# 5.1 Alternative Building Materials and Technologies.

Replacing materials which posses' high carbon emissions, that is looking for alternative building materials which use limited energy in production or travel less distances.

In condition, materials with higher embodied energy at production stage can be chosen over the materials whose transport or manufacture units are located over large distances in comparison the earlier mentioned materials with high energy.

This paper has been limited to only these two building materials only.

# 5.1.1. Alternative Building Material to Cement & Brick

The below mentioned few alternatives, has been identified as low carbon emitting materials. The below description suggests the amount of energy consumed and carbon released for 1 cubic meter of material and it also compares with alternatives mentioned below.

# Table 4. Alternative Materials to Cement

S.no	Material	Energy Consumed & Carbon Released
1	Cement	6926 MJ & 1249.6 Kg
2	Cement with 25% fly ash	5300 MJ & 933.50 Kg
3	Cement with 50% fly ash	3658.94 MJ & 632.41 Kg
4	Low Pozzolana cement	3508.93 MJ & 225.86 Kg
5	Ground Granulated Blast Furnaced Slag	511 MJ

# Table 5. Alternative Materials to Brick

S.no	Material	Energy Consumed & Carbon Released
1	Brick ( 337 nos)	1600 MJ & 208.4 Kg
2	Stablized Mud Block (222 nos)	637 MJ & 108.5 Kg
3	Hollow Concrete Block (53 nos)	483.36 MJ & 92.75Kg
4	Hollow Clay Block (71 nos)	639 MJ & 95.14 Kg

# 5.2 Carbon offsetting through Plant material.

Carbon offset is widely accepted methodology applied in various countries, It is works on the principle that plants in the process of photosynthesis absorb carbon dioxide and release oxygen. The carbon which is absorbed is stored in the plant, which is usually the woody content of a tree, Interestingly it was found that 50% of the total biomass of the tree is carbon only.

# 5.2.1 Understanding The Relation between Girth Classes & Carbon Sequestration Potential.

The potential of the tree in sequestrating carbon is high during the initial years and when the tree reaches maturity the growth of the tree is slow compared to those of the initial years. An example of Azadrichta Indica (Neem) has been taken to explain the potential it gains at different girth sizes and the overall carbon sequestrated by the tree when its girth reaches 200 cms.

S.no	Species	Girth Classes	Carbon Sequestration (kg)
1	Azadirachta indica	10-30 cm	11.2
2	Azadirachta indica	31-60 cm	56.2
3	Azadirachta indica	61-90 cm	260
4	Azadirachta indica	91-200 cm	2069

# 5.2.2 Relation between Girth of the Tree and Age of the Tree

The method of knowing the age of the Tree by the destructive method includes the count of annual rings that are formed at the breast level of the tree while the other method of assessment in regard to the age of the tree considering the non-destructive method, i.e by knowing the girth also needs to include the growth factor of the tree.

# Table 7. Relation between Girth & Age of the Tree

S.no	Species	Girth recorded	Years since planting
1	Azadirachta indica	218 cm	50
2	Azadirachta indica	335 cm	50
3	Azadirachta indica	415 cm	50
4	Albizia lebbeck	164 cm	50
5	Terminalia arjuna	180 cm	50

The above conducted study helps to formulate two findings

1. The relation between Age and the Girth of the Tree varies with different factors which also includes the growth conditions of the place where the tree is grown. There are various factors which affect the growth of the tree, the climatic factors, soil, water quality & availability and location of the tree. If the tree is located in the shade of the building or is located in full sun. The requirements vary with each species.

2. The age for which a tree is mature and falls under the Girth 90-200 cms category is noted as 25-30 years.

5.no	Name
1	Cocus nucifera
2	Manilkara zapota
3	Morinanga olifera
4	Cordia dichotoma
5	Salvadora persica
6	Alangium salvifolium
7	Gmelina arborea
8	Leucaena leucocephala
10	Phoneix dactylifera
11	Melia azadirecta
12	Butea monosperma
13	Emblica officinalis
15	Acacia tomentosa
16	Ficus religiosa
17	Wrightia tinctoria
18	Acacia leucophloea
19	Prosopis cineraria
20	Sturculia urens
21	Ziziphus glabrata
22	Morinda tomentosa
24	Bauhinia racemosa
25	Ficus Benghalensis
26	Terminalia arjuna
27	Terminalia elliptica
28	Sapindus emarginatus
29	Bombax cebia
30	Delonix regia
31	Dalbergia sissoo
32	Ailanthus excelsa
33	Acacia Senegal
35	Garuga pinnata
36	Acacia nilotica
37	Derris indica
38	Anogeissus serica
39	Pithecellobium dulce
40	Cassia siamea
41	Ficus racemosa

Table 8. Carbon Sequestration Potential of Trees

Carbon Sequestration@ 91-200 cms Girth
45
48
87.7
103.01
112.9
115.1
120
140
142.3
142.32
145.1
176.9
186.5
189.5
191.7
209.8
218.36
224.7
241.2
258.7
283.5
283.6
300
306.2
316.89
319.9
330.39
333.8
343.9
350
352.96
358
362.81
364.59
386.47
409.21
431.68
224.7 241.2 258.7 283.5 283.6 300 306.2 316.89 319.9 330.39 333.8 343.9 350 352.96 358 362.81 364.59 386.47 409.21 431.68

S.no	Name	Carbon Sequestration@ 91-200 cms Girth
42	Eucalyptus globulus	487.6
43	Acacia chundra	491.9
44	Peltophorum pterocarpum	494.6
45	Polyalthia longifolia	497.7
46	Madhuca indica	519.2
47	Diospyros melanoxylon	527.57
48	Albizzia lebbeck	534.7
49	Aegle marmeloss	563.79
50	Acacia tortilis	563.79
51	Acacia auriculiformis	694.7
52	Tamarindus indica	705.3
53	Mangifera indica	727.4
54	Holoptelea integrifolia	766
55	Tectona grandis	775.17
56	Syzygium cumini	794.5
57	Thespesia populnea	817.2
58	Casuarina equisetifolia	848.77
59	Azadiracta Indica	2013.5

## 6. ARGUMENT RAISED ON THE BASIS OF FINDINGS

Considering all the 3 findings, the research oriented towards building an argument where the factors affecting alternative building material and Offsetting through Plant material were considered.

Finding A - By replacing cement with these alternative building materials the carbon emissions can be brought down from 585.23 Tonne to 174.921 T.

Finding B - By replacing brick with these alternative building materials the carbon emissions can be brought down from 13.8 Tonne to 4.06 T.

Finding C- The Total Carbon emissions of the project were noted as 637 Tonne, which after replacing the above materials was found to be 217.16 Tonne

33% of Class A (0.5 Tonne per Tree) Therefore, 71.6 Tonne = 143 Trees 33% of Class B (1 Tonne per Tree) Therefore, 71.6 Tonne = 72 Trees 33% of Class C (1 Tonne per Tree) Therefore, 71.6 Tonne = 36 Trees

251 Trees need to planted to offset 217.6 T of carbon.

The argument raised by the research of what impact does specification of hard materials was answered by giving a choice to designers which can configure a system based on the best requirements which are applicable to the site. The choice of targeting the material like cement & brick has been chosen to be 50 - 50 (i.e 50 % of the total cement used in a project to be replaced with an alternative to cement) this choice can also range up to 100% of the total cement to replaced with alternative materials which emit less carbon.
The choice of targeting the plant material in terms of its carbon sequestration rate has been kept at 33% in an ideal situation depending upon the typology, location, and other factors if favorable multiple permutations and combinations can be worked out where may be the total number of trees are also reduced.

## CONCLUSIONS

The argument raised by various findings has been formulated to establish a better situation which helps the designer to mitigate the carbon emitted in the project. It has been found to that carbon neutral landscapes are not going to be achievable through these mitigation methods until we have a larger pallet of materials in terms of low carbon profiles or we have scope for planting trees in huge numbers as seen in the case example projects. Looking at it in a holistic way, If such an integrated approach is considered at the initial phases of a project is likely to avoid the need for later and more expensive mitigation or restoration measures from implementation.

Inspiring from a very old saying, "An ounce of prevention is a worth a pound of cure" (Benjamin Franklin) seems to be quite applicable in the current scenario. The prevention measures that can be taken at the initial stages of the project shall help to avoid the high mitigation measures taken from achieving carbon neutral landscapes.

The research formulated an approach "Reduce Alternate & Offset " as gives a complete understanding of how carbon emissions can be targeted. Reduce: It means to reduce material specification in any project. To minimize the quantum of materials so as it does not affect the function of the space. Alternate: It means to provide alternative building materials to those conventional building materials that are being used in any project. These materials have lower carbon profiles than those of the conventional materials.

Offset: When the carbon emissions caused by reducing and using alternative building materials then unavoidable carbon emissions need to offset.

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landscape architecture - a case of House-style community patterns in Cheng-gong segments".

# Urban Vegetation- beyond just green

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# ABSTRACT

With Urbanization taking pace, most of the Natural landscapes, Agricultural lands and Forest lands are getting converted into Urban-Man-made landscapes forming urban eco-systems which are characterized by built and unbuilt-man-made spaces. This is not only changing the physiography of the areas getting urbanized, but also highly modifying the ecological performance in terms of modifying biodiversity and ecosystem services provided by the natural landscape that existed before urbanization happened. The paper focusses on these Urban - Vegetated areas which are man-made and are the resultant of certain desires and decisions of the users, designers and other stakeholders. It tries to guestion the idea of creating artificial landscapes which are only aesthetically oriented. How important is the role of planting design in urban habitats? Does the word 'planting' justify itself because natural landscapes are not 'planted' but vegetated by certain natural processes and cycles unlike urban conditions where vegetation is planned, designed and planted. Hence should we re-define planting as a method to create artificial landscape which caters to only the aesthetical needs of the consumers? This paper will discuss the role of professionals and a new perspective on 'Planting design' and the basis on which it should be developed. It will emphasize on the importance of inter-disciplinary professional engagements which will make our decisions and designs richer. The relation of plants we choose to the built up spaces should go beyond the ideas of form, textures and visual appeal and be more towards understanding ecological importance of plants.

Keywords: Urbanization; Vegetation; Urban landscapes; Ecological systems; Planting

# **1. INTRODUCTION**

As population demands are on a constant up rise, urbanization is rapidly growing over the Earth's land surface converting every inch of it to human intervened infrastructure or landscape which are with good intentions to fulfill these demands. In this process, we are making irreversible impact on the natural biosphere. The growth is not only making the changes in land use patterns and physiographical changes which are more tangible but is also altering the intangible aspect which is the change in ecological performance of the areas its expanding into. The pace of this process is so rapid that long term vision of after effects of this irreversible change are often neglected. Ignore the after effects, there is not enough real time to even assess the impacts and judge its righteousness and the direction one is headed towards.

In fact, the way the Earth and its systems are turning out to be, we can slightly critical that the directions headed towards may not be the most appropriate. On the other hand, we cannot limit urbanization and we need to grow to accommodate demands of the human sustenance. Somewhere in between trying to meet the demands and trying to fit in the city in nature, efforts are being made to make sustainable cities and bring nature into the cities

But the question is what kind of 'nature' are we allowing into the cities. Are we trying to give back the same settling in which the land was in before our intervention or the greens that we are planning, rather planting, is foreign to the land?

# 2. CHANGING ECOLOGY - A CASE OF BENGALURU

Located on the watershed of two principal river basins, the Bangalore region is part of Deccan Plateau and presents dramatically varied terrains with the main ridge running north-northwest to south-southeast, effectively dividing Bangalore into two distinct topographical regions. This topography exhibits a radial pattern of drainage, distributing from the apex and flowing to the lower plains in dendritic and reticulate patterns. Bangalore, with its population of roughly seven million, is one of the few metropolitan cities located at more than 950m above sea level without any perennial source of water. To accommodate the increasing population demand and capitalistic ventures the city in the last decade has been expanding exponentially and sprawling over the surrounding orchards and agricultural fields, converting these into habitable urban clusters.

As per historical records, the city was named 'Bengaluru' because of the presence of the tree is said to have got its name from 'benga', the local Kannada language term for Pterocarpus marsupium, a species of dry and moist deciduous tree, and 'ooru', meaning town. Some stories say that the name was after 'Benga' – black beans that were grown in this land. Whichever story we choose to believe, the common thread is the connect to the existing ecological character of the city after which it is named.

The terrain of Bengaluru was of plains and hills which made agricultural activities possible due to its large gently sloped grounds. The local hilly terrain allowed dendritic pattern of water flow which allowed rain water harvesting easy and provided opportunity to build innumerous lakes to hold water for the sustenance of the city. The main components that made the city were 'pete' (town) 'thota' (orchards) 'kota' (fort) 'kere' (lakes). The natural components i.e. the 'thota' and the 'kere' provided the ecosystem services of provisioning, supporting, regulating and cultural association for the people living around it. The city seemed to be an integrated urban fabric of balanced distribution of natural and urban areas meeting the land capacity. The urban sprawl took over these areas due to increasing demand for to host the liberal economic growth. Thus, the imbalance was created. This brought in the typology of urban vegetation which was 'planted' by the private and public stakeholders. Moreover, the natural system that existed was disrupted. Lake beds were filled and orchards were cleared to make way for construction activities, more residential facilities and commercial and IT hubs and hence the infrastructure to support all these developments. As Bengaluru grew and expanded, the city skyline changed, it took the niche of being cosmopolitan, but along with this the intangible change that happened is the change in its Ecological system.

#### 2.1 The Urban Greens

The new typology of greens that the urbanization brought about is the urban vegetation. From landscape being naturally occurring forests and vegetated areas, the green component of landscape now was more structured, fitted into the urban fabric with pre-determined function and had to serve the assigned purpose. This purpose was majorly for the betterment of city dweller, for his recreation and partly for the environment regulation for example, cleaning the air, shading, etc. We see that the planned neighborhoods of Jayanagar, Sadashivnagar in Bengaluru have ample areas for parks which are meant to be used for recreation and are also contributing to maintaining the greenery of these neighborhoods. Thus, urbanization appears to lead to some clear patterns of change in the perceived importance of nature in the city. Regulatory and recreational ecosystem services take precedence over productive uses of ecosystem. From being common property, it's turning to private resource or public recreational resource.

The manifestation of these intents as we witness today are the fenced, cordoned, visually maintained lawns with pruned hedges. These are termed as public neighborhood parks. The private landscapes are those that are part of the gated and secured residential layout that are now plaguing over the city, especially across the extension areas. The mandatory 33% of green area as per the bye laws that ought to be provided in every development is being achieved. However, the quality of these green spaces is something that is worrisome and to be questioned. Two major issues can be raised on these open spaces. One, is that these are the left-over spaces after the required FAR (building bye laws) is achieved and all the anthropocentric infrastructure are for the proposed development. Hence these turn out to be the fragmented bits of land, in corners, rear areas or awkwardly shaped pockets of land that are merely accidental than even remotely planned for.

Second issue is the way vegetation is perceived in open spaces. It is primarily oriented to be more aesthetically pleasing, than serving any other large purpose. From public gardens and parks to personal house gardens, the choice of plants has changed. This has also changed the plant species available at the nurseries. A couple of decades before one would have found a rather different set of species in most local nurseries. The preference for showy plants, multicolored leaves over flowering varieties and fruiting plants has reduced in demand. These changes in plant species composition, driven by a transformation is the aesthetic and cultural preferences of the growing city, reflect a profound shift in the relationship between the city and nature. The changes have also had impacts on wildlife in the city.

So, the question arises, why did this shift happen? Most of the times, the natural vegetation that existed before the development happened, usually doesn't get recorded. The entire naturally existing vegetation then gets replaced by new varieties. The choice of new varieties becomes critical. The user groups, developers, landscapers, etc tend to make choices based on aesthetical value of the plants. This in turn affects the fauna of the region. For over a century we have favored ornamental landscape plants from China and Europe over those that evolved right here. If all plants were created equal, that would be fine. But every species is a different being, with specific requirements and what it can in turn offer, to environment and to humans.

What is followed currently, as a ritual exercise is planting the minimum required species from the list of plants stated by MoEFCC (Ministry of Environment, Forestry and Climate change) which has few native trees mentioned. But this has become just a mandate target to be achieved. The bodies that govern the Green Rating system such as IGBC (Indian Green Building Council) and TERI (The Energy and Resources Institute) mention the norms of planting in very generic terms stating the numbers/ quantities to be planted and area of open space to be provided. The performative analysis of plants and open spaces is not assessed in detail.

The study on what species belonged to the area, which plants can be part of the larger ecological cycle and play its role while serving other purposes as well is neglected. Whenever a planting proposal is done, it is like a blanket proposal, which holds good for all sites, irrespective of any contextual study. Everyone looks for immediate effects, and expects immediate physical change in the landscape. Firstly, it needs to be understood that landscape is an evolving process, which matures over time. It needs to be a part of the system before it shows any pleasing change. It doesn't work with appeal but it works with performance. The user groups, the service providers, the professionals and other stakeholders are always in such tied schedules with timelines that this time isn't allowed for a plant at all.

When we look at macro level urban forest areas, not much of detailed study is done here as well. The open space meant for urban forests or green belts, is also used for commercial driven plantations. For example, we see lot of teakwood tree, coconut tree, Eucalyptus tree plantations in these areas which bring a commercial value to it. The vegetation typologies which are integral part of animal food chains such as 'scrublands' and 'grazing grounds' are either pushed far away from city limits or are on verge of disappearing. Planting, in urban areas therefore, on one end of the spectrum, is just an aesthetical venture and on the other, a commercial motive.

Secondly, it is about the choice of the species. Plant species should be chosen so that it can perform multiple functions and not target at only one type of function. For example, sometimes plants are chosen just to enrich the bio-diversity. But the neglect is done towards other aspects like soil conditions, soil regeneration, suitable weather conditions etc. There is also huge neglect on whether the plant fits in the existing eco-system of that area, if it needs any processes to happen for its pollination which may not be prevailing in that area where is it decided to be planted or whether it is compatible with the plants it is made to fit in with.

#### 2.1.1 Planting v/s Vegetation

The word 'planting' is a verb, suggests that an action is being taken place, by man. Hence literally to the name, the process of planting and its result is evidently a human activity. Whereas the natural being of plants can be then termed as vegetation, since no one has 'planted' it. The existing plants are present in an area because of certain natural processes. When we, as professionals take decisions on plants to be planted, we need to think on whether it needs to look aesthetically planted or do we need a natural vegetated look. The entire process can be divided into two categories, where we choose, based on criteria on which areas can be planted and if we can reduce the planting and maximize the vegetated part of the project. This may then ensure that designer is taking a conscious decision to bring back the natural ecology of the area. A balance proposal, that not only looks at an immediate solution but a long-term sustaining performance in planting. Planting design as an act of promoting the natural process of vegetated landscapes instead of imposed planted landscapes in urban situations.

#### 3. WAY FORWARD – CASE STUDY

There are many efforts seen and documented where projects have adapted the changing process of landscape and its cycles as a part of design. Understanding of the evolution of landscape and integrating it with the design process is the way to be adapted for new developments.

Rao Jodha Desert Rock Park in Jodhpur India is one such example where the native species of the area was brought back with consistent efforts by Environmentalist Pradip Kishen and his team. The area is a rocky terrain lying in the shadow of Mehrangarh fort. The fast spreading species Vilaayati Keekar (brought in from Central America), Prosopis juliflora had taken over the entire area, which was an adapted species brought by the British in 1920's. When the project was assigned to Pradip Kishen by the Mehrangarh Museum Trust to 'green' the wasteland for visual appeal, the botanist chose to restore the natural ecology of the area by bringing back the native plants growing in that region. Pradip Kishen defines his project as an Ecological Restoration, "We use this term to describe what we do at the Park. We set out to try and restore this tract of land to what it might have been like before it was 'interfered' with by human activity. Our models are rocky, relatively unspoilt hills and scarps in Marwar's desert'.

Unlike this, the situation is that most of the landscapes that happen are a part of dense urban areas. These landscapes contribute to the quality and diversity of the urban greens. How can then, in such situations we look at bringing back the vegetated greens? The proposals should be backed by detailed study on the context, history of the site, documentation of the existing flora and fauna. The list of existing native species v/s the proposed should be valued with pros and cons and what effect would it make to the existing ecosystem. The justification can then lead to sensitive decision making.

#### 4. CONCLUSIONS

It is a given fact that human interventions will affect the ecosystem cycles and the only way ahead is to work in balance with the anthropogenic and ecological activities. There are many efforts put in by ecologists, landscape architects, naturalists etc. to strike this balance. But whenever situation demands, the human desires are put ahead of the ecological requirements and nature is made to compromise. In conclusion, the only point that emerges is whether we are willing to accept nature as a powerful source and adapt to it. Or do we want to twist and tweak and create entire new looking landscapes for our future, without knowing what existed before? The issue highlighted is not a standalone but a part of entire cycle which drives the biosphere activities. And our choices become a non-recoverable part of this cycle.

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Bangalore – Impacts of Urbanization on Ecosystems, Ecosystem Services and Biodiversity. In: Elmqvist T.et.al (eds) Urbanization, Biodiversity and Ecosystem services: Challenges and

# An Analytical Discourse on Metro Manila, Philippines Periurban Place Production through Culturally-valued Landscape Paradigms

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## ABSTRACT

The periurban areas in Metro Manila, Philippines are ruralurban interface zones. These areas sprawl from the edges of the highly urbanised city to the adjacent provinces of Region IV. The regional landuse shift continues to concern planners and scholars as community in-migration and environmental fragmentation regenerates the local character. The resulting regions are now challenged by the placelessness of the designed environments.

The changing place-based paradigm in the Philippines' periurban regions affects not just the inhabitants' place imagery, but also the culturally-valued landscape schema. It creates an ambiguous character that demands to be defined through the exploration of placemaking models and strategies. It posits a new dimension in placemaking that stems not just from the urban concepts of the city but combines the countryside notions of space and experiences that inhabitants of the periurban continue to identify with.

This paper is an initial approach to analyse the relationship of culturallyvalued landscape paradigms and placemaking strategies at the periurban regions of Metro Manila. It reviews the relationship between man and nature through the evaluation of principles, theories, and spatial models showing the perceptive and experiential response of inhabitants in the periurban environment. It will also highlight the importance of environmental perception and man's link to culturally valued landscapes to develop a responsive design to periurban environments. The discourse analysis is part of the research that intends to develop a cultural landscape responsiveness framework that will distinguish the landscape identity of the periurban regions of Metro Manila, Philippines.

Keywords: Periurbanisation; Placemaking; Emerging Cultural landscape; Metro Manila, Philippines

# **SECTION 3** LANDSCAPE AND CULTURE

Cathe Desiree Nadal<sup>1</sup>, Lisa Mackenzie<sup>2</sup>, and Simon Bell<sup>3</sup>

## 1. THE AMBIGUITY OF THE PHILIPPINE PERI-URBAN CHARACTER

The phenomenon of rapid urbanisation has affected the outskirts of Metropolitan Manila, also known as the National Capital Region (NCR). It is evidenced by the decentralisation of urban services and expansion of settlements in the outskirt regions of NCR. In the latest analysis of the Population Growth Rate of Philippines (Philippine Statistics Authority, 2016), rapid urbanisation has equated to the population growth rate of NCR's adjacent provinces - Cavite (3.86%), Rizal (3.50%), and Laguna (2.89%). These areas were seen to have the highest growth rate outside the NCR and are located at the adjacent Region IV.



Fig. 1. Population Density Map based on Landscan technology Image source: Population Explorer. (2 August 2016). Metro Manila.

The expansion of the urban ideals from NCR to the adjacent provinces of Region IV resonates McGee's (1991) desakota – a Bahasa word desa which means city and kota as a town. This term collectively translates to the combination of "agricultural, cottage industry, industrial estates, residential development, and other uses co-existing side-by-side." (Webster & Muller, 2009). As a desakota, the provinces combine the everyday conditions of Philippine rural-urban fringe settings with the sporadic mixture of industrial, agricultural, and residential land use that create a diverse and quite ambiguous development zone (Ortega, 2014).

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The ambiguity of Metro Manila's peri-urban character is further connected to Bunce's (1981) rural-urban fringe system. The man was argued to have a conscious desire to escape the city to "an environment of open space, natural landscape, tranquillity, privacy, and rural atmosphere." The myth has always been the aim of urban dwellers – an area with the conveniences of the city, the excellent views of the countryside minus the unwanted views of farming structures and olfactory discomfort from farm facilities. This desire has strengthened the need for more spaces with the urban and rural ideals seamlessly combined resulting in themed town developments with manufactured, consumer-driven landscapes. Consumerism changed the peri-urban by enforcing landscapes that are detached from the cultural values of the land.

In the case of Metro Manila, the peri-urban has grown enormously to include nearby provinces not just as a location for the new town development, but also as a site for resettlement projects to support the domestic demands of the city. As a result, alienation, class relations, and sense of belongingness challenged adaptation in the peri-urban (Ramos, 2015 June). What may be noted in most planning frameworks for peri-urban areas in the Philippines is the lack of the potential of "placemaking" in solving the problems enumerated that somehow affect the livability of man and sustainability of cultural and natural resources.

# 2. THE PROBLEM ON METRO MANILA'S PERI-URBAN PLACELESSNESS

However, as more areas are developed for the shelter demands in the peri-urban, far too little attention has been done to solve this widespread planning problem. A disconnect in the development guidelines applied in new settlements and the UN Sustainable Development Goals (United Nations, 2015) is yet to be subsumed. Also, building the peri-urban settlements in response to the local needs has infrequently been explored by various organisations with planning frameworks that render inconclusive results. Post-resettlement adaptation strategies are applied yet, at present, are not indicative of an identifiable peri-urban image.

The changing placebased paradigm in the Philippines' periurban area also grew to affect the inhabitants' place imagery and the culturally-valued landscape schema. This new criterion in the periurban regions of Metro Manila has developed a cultural landscape hybrid that demands to be defined through the exploration of placemaking models and strategies. In the understanding of the urbanisation process, how can placemaking strategies be applied to be able to enrich the peri-urban environment with city and countryside values that may create its place identity? How can we remove the place ambiguity that abounds the peri-urban landscape of Metro Manila?

#### 3. GOALS, OBJECTIVES, AND METHODOLOGY

The research was intended to explore the placemaking strategies, theories, and guidelines that have been developed to define the place in the peri-urban areas. It aims to develop a literary narrative that will consolidate and create the framework for placemaking in the emerging peri-urban landscape. With this as a goal, discourse analysis is applied through an extensive review of place meaning, placemaking strategies, and man-environment connections. The discourse analysis on placemaking is part of the emerging research that intends to develop a cultural landscape responsiveness framework through placemaking that will establish a more sustainable development approach in the periurban regions of Metro Manila, Philippines.

#### 4. AN ANALYTICAL DISCOURSE ON PERI-URBAN PLACEMAKING STRATEGIES

The placelessness of the peri-urban caused by the ambiguity of its spatial character relates it to several studies done to explain its function in urban and rural areas. In the 1980's when the periurban was called the rural-urban fringe system, there were emerging arguments on the role of this zone. Troughton (1981) has suggested two possible functions that can define the rural-urban fringe: an interface area and a barrier. He has also recognised centrifugal and centripetal forces that results to the peri-urban spatial identity. These forces create the space clutter of "residential lots, quasi-farms, or rural estates". The migration to the city for residence, employment, business and leisure has also been common. The forces also influenced the movement of business, retail market, institutional and educational facilities to the peri-urban.

The response to this new peri-urban zone also resulted in the changing lifestyle of the migrants that live in the peri-urban, and work in the urban core. It has also developed the commuting zone for movement, which was eventually identified as the location for incoherent and repetitive landscapes – a sporadic, automobile-centric linear development of strip malls, supermarkets, road support facilities, and vacant lots (Chase, Crawford, & Kaliski, 2008).



Fig. 2. Settlement conditions at Southville 10, a resettlement community at Tanay, Rizal Image Source: Resurreccion, R. (05 November 2016). Southville 10.

Relocation housing projects have also been seen in peri-urban areas of Metro Manila. Population living in poor communities or regions that were adversely affected by disasters (Philippine Institute of Development Studies, 2014) were most of the target residents of these resettlement housing. However, the spatial character of these relocation blocks is relatively different from new town developments constructed for the middle to upper class. Regardless of the excellent views of the countryside and the location in the outskirts, the resettlement villages have been devoid of any connection to the idyllic countryside in the spatial context. High-density housing (HDH) that maximises space was common as there was limited land. Placemaking or creating a sense of place in these relocation areas wasn't part of resettlement planning strategies. Ballesteros, a Philippine Institute of Development Studies senior research fellow, noted that "The Philippines lacks a national policy on shelter development that integrates infrastructure, housing, and environmental concerns. The current approach to accommodation is primarily on a per project basis instead of a city-wide housing development." And even in that context, the sense of community belongingness for adaptation is not a priority at the moment (Philippine Institute of Development Studies, 2014).

#### 4.1 Place as the Interface

"Project for Public Spaces" has highlighted the public space as a placemaking approach around cities (Placemaking Leadership Council, 2016). In this project, placemaking was an important strategy that applies community aspects – sociability, uses and activities, access and linkages, and comfort and image. Describing places in this context will help develop its identity and recognise its tangible and intangible values embedded in the man-nature interface at the neighbourhood level. Recognizing the place-led, community-based process can be able to integrate the needs and aspirations of the community in the rapidly changing environment and develop a sense of belongingness to the built and natural environment.

The place as the interface has been studied as early as Hayward's (1978) introduction of his nine dimensions of the home. These nine dimensions include: 1./ relationship with others, 2./ social networks, 3./ statement of self-identity, 4./ place of privacy and refuge, 5./ place of stability and continuity, 6./ personalized space, 7./ locus of everyday behavior and base of activity, 8./ childhood home and base of upbringing, and 9./ shelter/physical structure. Hayward has seen home as a good analogy on how the place can be given meaning at the personal level, as it connects important cues and components to the smallest unit of the society that one can attach meaning.

Walter (1988) on the other hand interpreted Plato's doctrine of place as a receptacle that must be a holistic ensemble of experiential qualities. The elements of experience within a place contains: morphai or shapes, dynameis or powers, and pathe or feelings. Place components can, therefore, be translated to include: patterns imposed by rationalised perspectives such as geometry, economy, city planning, the energy that can give the city material form, and human experience generating representations in the lifestyle. Walter also added Plato's "psychagogy", or an expressive space concept that has characterisation based on moral and emotional implications. To quote, "the surface of a place gather's symbols and through them achieves a unity of expressions. Surfaces of a city are covered with marks, stains, images, symbols, and messages that give something to think about."

#### 4.2 Placemaking Approaches

Place theorists as early as the 1980's discussed placemaking as an integral approach in creating the man-nature link. Rapaport (1982) has written about a three analysis approach to communicating with the environment that includes semiotics, symbolism, and nonverbal communication. By applying the semiotics approach, the environment is analysed as a sign which contains a sign vehicle, a designation, and an interpreter. In the symbolic approach, the environment is observed, then landscapes are analysed, and the cultural knowledge of the environment is interpreted using codes. The non-verbal communication approach, on the other hand, relies on natural stimuli, observer sensitivity as well as person's willingness to make discrimination of the environment. It includes an analysis of the wide range of components in the environment, namely: the sender or encoder, the receiver or decoder, the channel, the message form, the cultural code or form of encoding to be done, the topic or social situation or intended meaning by the receiver, and the context or scene. The challenge with Rapaport's three-level approach includes the arbitrary nature of the codes.

Rapaport (1982)continues the analysis of the man-environment communication approach by discussing it in connection with urban features: the creation of artefacts by particular groups with uniformity of character, the development of the specific character at the area level, and the regularity or irregularity of lot layout that sometimes connote social status. Cognitive mapping was also a proposed tool in evaluating mental representations of place (Kaplan & Kaplan, 1982; Lee, 1982; Stea, 1982; Tolman, 1948). Creating mental maps can create waypoints, the hierarchy of places, space boundaries, path networks, and the concept of neighbourhood. By doing cognitive maps, one can see place attachment at the personal and neighbourhood scale.

A more recent study by Marot establishes the necessary system of Mnemotic Places (2003). This system can be manifested initially in the form of architecture and objects, but its connection to the garden was a revelation. Supported by John Dixon Hunt, the garden schema became an essential placemaking model as it "expresses elements, motifs, patterns, wild and transformed nature as they were found in the territory surrounding a site". Several connections of the garden to geography and mnemonic images create a semanticization of the land and as Hunt states it, "lends nature the status of a landscape organised into spaces".

The importance of health in present-day communities is a noticeable socio-spatial factor that drives communities to experience places. Integrating healthy places into planning policies and economic strategies is an emerging tool in improving the quality of spaces in the peri-urban. A grassroots approach to placemaking using "health" has also started at the global level. Eitler et al. (2013) supports this claim by creating guidelines to healthy placemaking which includes: putting places first, recognizing the economic value, empowering champions for health, energizing shared spaces, making healthy choices easy, ensuring equitable access, mixing up components, embracing the unique character, promoting access to healthy food, and making it active (Eitler et al., 2013). Adopting these strategies may create place leverage in areas that are devoid of social and personal benefits.

Another good approach to placemaking in the peri-urban area explores the provision for community interaction to define "places". Communities currently struggle with the rapidly growing population and an environment faced with climate change challenges (Hou, Way, & Yocom, 2015), yet are still potential assets in developing places. Several exampled stated in "Now Urbanism: The Future City is Here" (Hou et al., 2015) explores several community codes in creating a culturally sensitive place image in the city – the use of vernacular community images, the introduction of community farming, re-establishing public performances. A good example in Philippine's local context is Luntiang Barangay (Nadal, 2015), a project that explored the possibility of having design professionals as facilitators in community placemaking. Design professionals act as facilitators in the placemaking process while communities create place visions. The design, implementation, and maintenance stage becomes the interface where attachment to the emerging peri-urban landscape is most felt because of continuous "place" involvement. Being able to capitalise on the imagination of the community may eventually conceive a peri-urban image where the migrants become locals and the consumer-driven, and placeless environments become culturally-valued landscapes.

#### 5. SYNTHESIS / CONCLUSION

As an initial analysis of the literary context that may explain the peri-urban identity, it is possible to confirm that the personal and community level interaction of man to his environment may be the foundation of a successful peri-urban placemaking strategy. By being able to connect with the environment, the attached symbols, signs, and codes to a culturally-valued landscape is interpreted and resonated as a place image.

A second conclusion involves the complex interaction of quality places to the moulding of the peri-urban character. Understanding the ideal landscape that man aims to interact at can also help create the definition of peri-urban areas. It can lead to centrifugal and centripetal forces that can move people to the peri-urban because of the livability and environmental sustainability potential. Being able to connect to major geographic forms like the bay, rivers, and the mountain are also key components to attract people to the peri-urban and develop imagery attached to guality landscapes.

Lastly, placemaking approaches that are identifiable at the neighbourhood level have been a revolutionary approach by placemaking movements around the world. Being able to create a culturally-sensitive strategy that may form the peri-urban character of the urban fringes of Metro Manila. The everyday landscapes of the community can prove to be a helpful strategy in the creation of culturally-valued places.

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# An exploration of the implication and feasibility of UAH (Urban Agricultural Heritages) in China

# ABSTRACT

After exploring the relationship between the urban agriculture and cultural heritage, this paper focuses on the Urban Agricultural Heritages (UAH), it defines the concept of UAH by combining the related organizations and best practice analysis. Then through the introduction of China-NIAHS and two case studies, the research emphasizes on China, in order to contribute to the development of UAH.

Keywords: Urban Agriculture; Urban agricultural heritages; China-NIAHS

## **1. INTRODUCTION**

It is generally acknowledged that a consequent social and environmental problems have risen numerous serious new issues together in the urban area, such as the decrease of farming land, the absent of natural resource and the issue of food safety and security. By contrast, the passion to country life from citizens is still on-going. Based on this issue, Urban Agriculture (UA), as the "growing of plants and raising of animals within and around cities" (FAO, 2007), has started to become an excellent tool for designing and maintaining the cities green infrastructure. It points out interlinks and interactions between urban economics and ecological system, which is embedded in, and interacting with the urban ecosystem. (Lohrberg & Timpe, 2015). There is no doubt that UA provides urbanite with high-quality recreational experiences and sustainable environment. Although the multifunction of urban agriculture is conspicuous, is it possible to explore its cultural function in depth?

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Institute of Landscape Architecture, RWTH Aachen University, Germany Jaobstrasse 2, 52056, Aachen yjiang@la.rwth-aachen.de UA was a historical phenomenon, and also is a recurrent possibility through time (Björklund, 2010). The relationship between the city and agriculture has a long history: the agricultural landscape around cities has always been a place of food production and recreation (Branduini, 2015). In the past, rural surroundings were the daily food supplier for city dwellers. Vegetables, fruits, cereals, and animal products were sold in the markets located in the main squares of the city. But as the development of the modern science and technique application, traditional agriculture has been losing its status. For this phenomenon, my research emphasizes on Urban Agricultural Heritages (UAH). UAH is one of the heritage styles among the world heritage which reflects the brilliant wisdom of local residents. Generally, we described it as well-formed traditional agricultural landscape and agricultural production system with long history in the urban and semi-urban area.

# 2. CURRENT RESEARCH PROCESS OF UAH

# 2.1 Related organization

Now, there are many scholars and experts who are doing research on agricultural heritages to protect their diversity and uniqueness from global perspective, for instance, the Globally Important Agricultural Heritage Systems (GIAHS) which proposed by FAO. GIAHS programme can contribute to identify and safeguard important agricultural heritage systems and their associated landscapes, agricultural biodiversity and knowledge systems through catalyzing and establishing a long-term programme to support such systems and enhance global, national and local benefits derived through their dynamic conservation, sustainable management and enhanced viability (FAO, 2002). The concept of GIAHS is distinct from, and more complex than, a conventional heritage site or protected area. Furthermore, it does not emphasize the specific location of the site.

Hence, in my research, in order to pay more attention to the relationship between agricultural elements and urban features and characteristics, I put emphasis on digging into the agriculture factors in the aspect of culture, instead of thinking deeply about the ecological or biological function.

# 2.2 Best practice analysis

Additionally, some excellent examples of UAH of practice are found in the Europe. For example, Bamberg is a town in southern Germany, the "Urban gardening" was an important economic and cultural component of the World Heritage Site since the Middle Ages and is still practiced in the city. Because the sector has shrunk, however, much gardening land in the inner-city area has fallen out of use (Organization of World Heritage Cities, 2013). Then the local government started to propose the project "Urban Gardening", which is intended to keep alive the typical Bamberg gardeners' culture, to develop new methods of gardening and to preserve the unique and outstanding inner-city gardening lands as part of the UNESCO World Heritage. The organizer made a scenic route planning, 18 scenic spots and 9 nurseries are included in the route, and small green signposts are arranged, which provide information about the history of urban gardening and local gardeners. They also contributed to the establishment of the Gardeners' and Vintners' Museum.

Behind the museum in the historic domestic garden vegetables and herbs are cultivated as well as liquorice (the indigenous plant), which together with onions was historically one of the main products of Bamberg's gardeners (Figure 1).





Fig. 1. Gardeners' & Vintners' Museum and the historic domestic garden.

To sum up, the concept of UAH consist of two parts: tangible heritages (agricultural tools, native species, historic sites, territory structure, etc.) and intangible heritages (practices, folk activity, skills, artefacts, etc.) (Figure 2). Some selection criteria are as below: 1) with a long history in urban and semi-urban area, 2) have agricultural and cultural heritage value, 3) have potential to access to sustainable development, biocultural diversity, including agro-biodiversity and ecosystems management, etc. or with agricultural traditions or regional living expressions inherited from ancestors and passed on to descendants. My research will attach importance to protect and innovate the existing urban agricultural heritage (tangible & intangible) by using the method of landscape architecture to inherit specific agricultural civilization.

An exploration of the implication and feasibility of UAH (Urban Agricultural Heritages) in China

	Main building of museum	
9 9 9 9		
	Open space	7



Fig. 2. Diagram of tangible heritages and intangible heritages.

# **3. SITUATION OF UAH IN CHINA**

## 3.1 Why UAH in China

It is widely considered that the agriculture is of great importance to China as a large agricultural country. To some extent, it can be seen that Chinese historical identity is based on a constant relation with agriculture With a long history of agricultural development, Chinese farmers have been performing a variety of agricultural practices suitable for different natural conditions and creating splendid agriculture, including agricultural landscapes, knowledge, techniques, etc. The solid foundations for the study of agricultural development were laid by the research in agricultural archaeology, agricultural history, philosophy of traditional agriculture, and agricultural folklore started at the beginning of the 20th century (Yu, 2010). It is a milestone of the study in agriculture in China, characterized by cooperation among multi-disciplines, combination of theory and practice, and the harmony between conservation and development. We can believe that the development of UAH in China has strong potential, based on its abundant theoretical and practical background.

# 3.2 Overall development of UAH

According to the successful of GIAHS programme, on September 2014, the China National Important Agricultural Heritage Systems (China-NIAHS) was established in support of the GIAHS Initiative. In collaboration with national research institutes, the mechanism of agricultural heritage protection has been strengthened in China (FAO, 2014).Until August 2017, there were 62 China-NIAHS sites (Figure 3), we can also find some of the UAH programme in the list.

# 3.3 UAH case study in China



#### 3.3.1 Xuanhua Grape Garden

Site location: Xuanhua District of Zhangjiakou City, Hebei Province

Garden cultivation of Xuanhua milk grapes uses traditional technology of funnel frames and polyclonal hole-planting methods, which is considered as having important historical and cultural value. The funnel-framed vineyard system is a unique structure being "square inside and round outside". This structure allows for traditional grape planting, cold threat reduction, using of organic manure fertilization techniques and the cultivation of many other plants. Strongly linked to the culture, milk grapes is part of the identity of the Xuanhua inhabitants.

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The Xuanhua traditional vineyard system, a typical example of Chinese garden agriculture, not only maintains the national heritage, but also provides outstanding advantages of enriching biological diversity, changing eco-system and assuring food safety (FAO, 2013).



Fig. 4. Location & image of Xuanhua Grape Garden.

# 3.3.2 Octagonal Diagram Field Relic Park

# Site Location: Hangzhou, Zhejiang Province

the Octagonal Diagram in China means lucky and fortune, this park was built for the emperors to pray for the future great harvest in the Southern Song Dynasty (1127-1279). At that time different parts of Octagonal Diagram Field has various kinds of crops such as soybean, rice, corn, etc. Now, this park was redesigned and has become the landmark in the urban area, it is also considered as an ideal place for learning Chinese agricultural history and environmental issues (Figure 5 & 6).



Fig. 5. Location & image of Octagonal Diagram Field Relic Park



# 4. CONCLUSIONS

China has great potential to develop the UAH, the relationship between agricultural elements and urbanization is worth to be paid more attention to. Also we need to learn more experiences through some international organization, cooperate with each other, and even do research on the regional development policy differences among several countries.

An exploration of the implication and feasibility of UAH (Urban Agricultural Heritages) in China

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# Vernacular Landscape of the Traditional Impounding Lake System in China

# ABSTRACT

Vernacular landscape derives from the interaction between dwellers' daily production and environment through the history. The study of traditional water conservancy systems can help to sort out the kernel of vernacular landscape. According to the relative consistency within particular regional landscape and the dissimilarity among various regions, the types of water conservancy landscape pattern regarding to different geographical conditions is analyzed. Furtherly, the paper puts forward the main landscape elements and structure pattern of the vernacular landscape with the impounding lake system as example, and summarizes the impact mechanism and protection strategy of the lake landscape.

Keywords: Landscape Architecture, Vernacular Landscape, Water Conservancy Landscape, Impounding Lake System

Water and land are two relatively independent and interacting material elements, resource elements and also landscape elements. In the area of human settlement construction, land texture, water network and other natural or artificial factors formed a complex interacting system through the long history, it is the integrated outcome of natural geographical conditions and human intervention activities altogether. Vernacular landscape refer to the landscapes formed by the dwellers' adaptation and utilization of the local geographical environment, including not only the landscape formed with natural causes, but also the natural transformation caused by of human production and life, including water conservancy landscape, agricultural landscape, settlement landscape and so on. At present, the studies of vernacular landscape in China focus mostly on architecture and settlement, tends to ignore the relationship between regional characteristics and productive activities, causing the study of the vernacular landscape relatively static and fragmented, and lacking systematic research from the global perspective, which limits the application value of vernacular landscape studies in China.

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# 1. THE FRAMEWORK OF REGIONAL LANDSCAPE DERIVED FROM REGIONAL WATER CON-SERVANCY IN CHINA

As a composite research object, the water landscape owns the functions and characteristics both of the vernacular landscape and the water conservancy projects respectively. Thus its research should focus on its characteristics of interdependency as a system, interactivity as a structure and inter-supplying as a resource flow.

The geographical variation and regional consistency of geographical features and hydrological conditions form typical water conservancy landscapes that are adaptable in each region. China, with typical East Asian monsoon climate, most of its the territory are suitable for crop growth, but due to large variation of precipitation in the distribution of space and time, coupled with the climate differences brought about by laddered landform, the precipitation distribution and crop growth periods are often not matched properly. In this context, the water conservancy project has a strong correlation with the regional environmental characteristics, such as the plain areas are usually presented with intertwined canal system for irrigation as hydrological skeleton; hilly areas often has the water conservancy system of imponding lake combined with canals relying the landform; mountainous areas making use of the massif to form reservoirs, collecting streams and mountain water catchment; in the lowland areas with natural water lakes, dike systems are formed, such as the typical polder landscape in Ningshao Plain; and also the seawall landscape in the coastal areas.

## 2 IMPONDING LAKE SYSTEM AND LANDSCAPE PARADIGM

Imponding lake system is a kind of water conservancy model commonly used in hilly and butte plains, which is structured with the imponding lake and the canals. It was stated in the Yuanzhou Records of Hunan Province in Qianlong period, "Constructing dike as the barrier to reserve water". In the study of farmland water conservancy, "Bei(陂)" usually refers to the artificial water storage projects using lowland to pond the surrounding water catchment, forming the retention for the nearby runoff. China's history of building imponding lake is also kept for thousands of years. As Huainanzi recorded, "build dykes with hills, the water will sure to be enough." It clearly described the difference between imponding lake and natural lake, that the imponding lake is formed with artificial embankment. The imponding lake as the collecting section and the drainage canals as the transporting section altogether form an engineering system to meet the water demand and carry out water regulation of small watershed. The imponding lake water conservancy can be well adapted to the natural terrain, plays an important role in water storage and transportation.

# 2.1 The Development and Evolution Process of Imponding Lake System in China

The development of traditional imponding lake system can be divided into three stages: Neolithic period to the Shang and Zhou Dynasties are budding period. The exploration of primitive agriculture has led to the beginning of the soil and water management, four thousand years ago Gong Gong blocked off the rivers to prevent the floods, yet these methods led to more serious flood. Xia Yu searched for another way, "making ponds to block in the running off", which combined water storage with flood control, made significant breakthrough. The second stage came at the period of the southern and northern dynasties as the prosperous construction period, especially in the Han Dynasty when farmland water conservancy and irrigation projects prosper. The combination of imponding lakes and canals took up the dominant place as the emerging and mainstream of the irrigation engineering and technology at that time. China's first large-scale imponding lake Que Bei in 600 BC was built in Huainan Area, and further developed southward in Eastern Han Dynasty. The imponding lake in this period are arranged with dams, water doors and overflow facilities on the plains or valleys, forming relatively complete dynamic control system of storage, irrigation and drainage; the third stage is the further improvement period after Sui and Tang dynasties. The systematic management and efficiency of imponding lake system are focused in this period. Chen Jun's "Agricultural Book" also summarized the related strategies.

# 2.2 The Main Landscape Elements of Imponding Lake System

It is possible to decompose it into a number of interrelated and mutually supportive landscape elements in terms of the spatial interpretation of the landscape features derived from the imponding lake system. But in terms of time interpretation, it can be categorized into three stages: water storage, irrigation and discharge, which compose the elastic regulation cycle mechanism. The core purpose of the imponding lake is to solve the conflict between water supply and water consumption in the time distribution and water height level. The realization of its water regulation depends on the interaction between various elements, and the joints of different elements are both functional carriers and landscape carriers, which together construct the regional landscape types with specific structural patterns and specific characteristics. The Hanzhong Imponding Lake model demonstrate clearly the basic structure of the system: water storage lake, dam, gate (water gate) and paddy field. Dams were located between paddy fields and the imponding lake, with water gate in the center. The gate is set to control the water storage and water supply at regular time and in quantitative size, which is the prototype of the modern reservoir hub. In the later development, the perfect facilities such as pipe-shaped culvert and overflow system, recycling system derived.



Fig. 1. This is the small-scale imponding lake model unearth in 1979 253 I 2017 IFLA Asia Pacific Regional Congress Therefore, the ideal imponding lake landscape system usually includes environmental base (plains / isolated hills / hills), water storage lake (dynamic changing water), water retaining dams (dikes/ weirs), water-gate facilities (water gates / culverts) and overflow channels or rivers. Some also include waterwheels and other auxiliary recycling facilities. At the same time, imponding lakes tend to exhibit heterogeneous landscapes with the same structure and landscape elements system according to the varied environments, which is related to the adaptability of the landscape elements to the environment. In general, imponding lakes can be roughly divided into plain imponding lakes and hill imponding lakes according to the terrain and landform of where the lake is located. (As shown in Table 1)

The peak construction period of the plain imponding lakes is in the pre-Qin and the Southern and Northern Dynasties. These projects centered on the well-developed Huaihe River Plain and the lower reaches of the Yangtze River Plain. Due to the low terrain, such imponding lakes in the plains usually are formed based on long embankment built around. The embankments are usually low and narrow, the shape of which are straight, curving, U-shape or circular. The center of the imponding lakes are wide. Due to the lower water level, islands can be seen scattering in the lake, guiding the direction of the water, creating the harmonious lake landscape among the islands, embankment and the vast expanse lake surface. The typical plain imponding lake is Hongxi Lake, located between River Ru and the River Huai in Henan, it is also the imponding lake with the largest surface at that time. The embankment was constructed in the low-lying areas, revolving for more than 200,000 meters (Figure 2). Hongxi Lake feeds the surrounding cities, irrigating thousands of hectares of fertile land. Great profits Hongxi Imponding Lake brought were recorded in the biography of Deng Chen in the Book of History of the Late Han-Dynasty. However, large areas of Hongxi Lake were destroyed by turning the lake into the farming field at later time. For several times the lake was restored after the floods, with the broad lake transforming into dozens of small lakes. Such plains are often abolished by being enclosed for cultivation due to the shallow water surface and vast covering area, with population growth and agricultural development.

Table 1: A Comparison between Categories of Imponding Lakes and Landscape Elements

Types of Impounding Lakes	Features of Dikes	Features of Lakes	Features of Water Level	Features of Sluices
Impounding Lakes in Lowland Plains	Dikes are relatively long, mainly including straight dikes, crooked dikes, horseshoe dikes and annular dikes. Dikes are relatively low andnarrow.	Mainly rely on the dikes to impound water, consequently form a relatively wide and calm water surface.	The water level is usually relatively low and the depth of water is relatively shallow.	The volume of sluices and other facilities are relatively small and the construction intensity is relatively weak.

Impounding	The dikes relies on	The shape of	The water	The sluices, water
Lakes in	mountains with the	impounding lakes	level is usually	doors and other
and Hilly Area	engineering to connect with adjacent mountains. Dikes are relatively short and high.	go along with the surrounding mountain terrain. The lakes are usually located in the valley.	and the depth of water is relatively deep.	relatively complex with high strength but the number is limited.

Imponding lakes in mountainous and hilly areas are usually located in valleys, connected with the adjacent mountains by minimal amount of engineering, carrying and storing the water from all mountains so as to protect the downstream cities, villages, farmland from seasonal floods, and also supply stored water for dry seasonal irrigation and urban water supply. Compared with the imponding lakes in plains, the mountain lakes are small but deep. High water level also requires the construction of the dam and flood control gate facilities with high strength and high technology. Aijing Lake, built in Yangzhou in the Eastern Han Dynasty love King Pei is a typical mountain imponding lake which took advantage of three sides of the towering mountains, with only one short embankment in the southeast side, blocking 36 branches of water from the mountains (Figure 3).



#### Vernacular Landscape of the Traditional Impounding Lake System in China



Fig. 3. This is the map of Aijing Lake

## 3. THE EFFECTS ON VERNACULAR LANDSCAPES OF IMPONDING LAKE PROJECTS

The basic applicable principles of how imponding lakes affect geographical styles can be summarized by combing the functions of different types of imponding lakes and their process of shaping the landscape at the same time: First, in the landscape structure of the imponding lake system, the embankment is usually constructed according to directions of the water catchment. The regional hydrological texture and hydrological processes are changed by human interference to the natural process in water conservancy construction. Second, in the long-term management and renovation of the lake system, it gradually transform the vernacular landscape, such as the use of dredging mud to form dikes and islands, plantation of the rows of plants on the dam to consolidate the embankment, the pavilions, houselets, towers, courts and other constructions built to limit the paddy field in a fixed area, as well as some auxiliary facilities such as water gate, drainage canals, wells, waterwheels and so on. In addition, the imponding lake system often affect the style of the vernacular landscape indirectly through the combination with the local culture, such as poetry, painting and calligraphy, folks art, etc., so as to form a distinctive regional culture by way of the imponding lake.

Professionals and the public should have a clear understanding of the value and potential of the imponding lake in scenic tours and ecological sustainability, and with a view to protect, renovate and even restore them from the comprehensive and systematic perspective instead of a non-monomer perspective so that they continue to be a part of the regional or urban natural system, maintaining its features, carrying and extending the local culture and distinctive landscape.

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Vernacular Landscape of the Traditional Impounding Lake System in China

# Firearms and Roses: Spatial Strategy of Military Heritage Landscape Reuse of Keelung Harbor Fort\*

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# ABSTRACT

Keelung is natural fine harbor with rich coal mine and has important economic and strategic positions. Many defense forts and artillery batteries were built during the Qing Dynasty and the Japanese occupation period. Currently the forts were successively liberated for the public and connected with the communities. The purposes of this research are: (1) to investigate the cultural, natural and social value of forts, (2) to explore how community use and how local affection toward forts, and (3) to provide the reuse strategy for heritage forts. We integrate value of culture, environment and social connection of the forts and classify three reused stereotypes: "tourism", "community and tourism", "community and conservation", in order to provide management suggestions for cultural landscape revitalization.

Keywords: Cultural Landscape, Slope Community, Sense of Place, Artillery Battery

\*Acknowledgement: The authors would like to thank "Aim for the Top University Project of National Taiwan Normal University" for finical support.

## **1. INTRODUCTION**

There are natural fine harbor and rich coal mine in Keelung and the city has important economic and strategic positions. It is the earliest industrialized city in Taiwan and has been the front to contact the world in the age of discovery. It has abundant historical heritage. During the periods of Qing Dynasty and the Japanese colonization, many forts were constructed for the purpose of defense and it becomes the area with the densest ancient forts. From perspectives of space and landscape value, ancient forts and related military facilities are hidden landscape. They match defense principle of Prospect-Refuge Theory. Besides, the natural environment of ecological diversity meets ecological and green architecture principles. Techniques of construction and architecture at the time were extremely fine craftsmanship which specifically presents the spirit of battlefield and value of UNESCO World Heritage.

With important culture and history and abundant natural resources, ancient fort area of Keelung becomes the place for people's tourism and recreational activities. In the past, fort area was military land and it was significantly separated from the communities in the surrounding. With the declination of military affairs, the forts were successively liberated for the public and connected with the communities. However, currently, research on Keelung ancient fort area only focuses on preservation of cultural assets instead of natural and social value. Thus, questions of this study are the following: how to define history & culture, nature and social value of forts? What are the public's use behavior and identification with forts? How to develop different activated and reuse strategies according to different preservation values? Research purposes are shown below:

- (1) nature and social value).
- It probes into the public's use and local affection toward environment of forts (2)
- (3) It explores reuse strategy of military heritage of forts

This study conducts field research on five surrounding forts of Keelung Harbor and according to current situation investigation (including natural environment, convenience of transportation, historic value, current situation, etc.) and social capital investigation (including current use, residents' use behavior, tourists' use behavior and residents' local affection), it analyzes development strategy of surrounding five forts by argument as the reference for future use of fort area.

# 2. LITERATURE REVIEW

# 2.1. History of Keelung and fort

Keelung has been occupied by foreign force for several times in the past to serve as center of governance or important trading harbor. In early 17th century, the Spaniard and Dutchmen successively occupied Keelung. The governance was based on Heping Island; in 1723, the immigrants from Zhangzhou of Fujian launched the cultivation in Keelung harbor area and gradually established streets in Keelung. Thus, they started the cultivation in inland and mountains of Keelung. After Anglo-French expedition to China, in 1863, Keelung was designated as trading harbor with the harbor liberation in Taiwan. In 1884, the Sino-French War was broken out. Nowadays, by the side of Chung-cheng Rd. in Keelung, there is still a cemetery of French soldiers in memory of French military men who died in Taiwan at the time. In 1885, grand coordinator Liu Mingchuan reconstructed Keelung Harbor and founded several forts along north and south axis of harbor area. Most of the forts still remain nowadays.

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It explores value of forts and surrounding community environment (including history & culture,

In Treaty of Shimonoseki of 1895, Taiwan was ceded to Japan. From 1899 to 1935, there was construction of Keelung Harbor of four phases. In the surrounding of Keelung Harbor, it constructed several military fortresses, such as Keelung fortress command in modern time and implemented "modification of the city" project. Keelung streets were divided into blocks in the form of check. Several rivers were dredged. They were the bases of most of urban planning in Keelung city of nowadavs.

In February 28 Incident of 1947, Keelung was one of the most damaged places in Taiwan. In the year, repressive force of the national government landed from Keelung Harbor and it resulted in more profound historic context in related facilities of Keelung fort. At the time, the national government moved to Taiwan and numerous troops and relatives crowded into Keelung and the city experienced the period of prosperity. In the following twenty and thirty years, because of coal mine and several times of harbor expansion construction, economy in Keelung was considerably boosted. In 1984, the city was listed as Top 7 container port of the world. In 2008, Port of Taipei was launched. Operation of Keelung Harbor was changed to harbor tourism industry and Keelung became Satellite City of Taipei Metropolis.

"Modification project of Keelung city" in the period of the Japanese occupation divided the mountains in the surrounding of Keelung Harbor into several areas of military facilities. In Dashawan District, Keelung Fortress Command and Keelung branch of Army Transportation Department (abolished) were constructed. It governed government buildings, camp area, ammunition depots, fort area, military hospital and military dependents' village. Thus, Dashawan and the surrounding Ershawan became the areas of important military facilities. Nowadays, among Keelung military installations, only Fortress Command and the surrounding forts governed remain. The rest are eliminated or reconstructed because of urban construction. According to statistics of Ministry of Culture, there are 8 large forts existed in Keelung. From the east to the west, they are Gongzi Liao Fort, Sheliao Fort, Dingshihge Fort, Ershawan Fort, Shiqiuling Fort, Baimiweng Fort, Mushan Fort and Dawulun Fort (Figure 1); among others, Ershawan Fort, Gongzi Liao Fort, Dawulun Fort and Baimiweng Fort are national historic interests. Dingshihge Fort, Sheliao Fort, Shiqiuling Fort and Mushan Fort are municipal historic interests since their present conditions are inferior and the scales are smaller. Other small-scale forts are not listed in preservation of Bureau of Cultural Heritage. Ministry of Culture and thus they are not in the statistics. Construction years and current situations of the forts are shown in Table 1.



Source: authors

Table 1. Construction years and current situations of some forts in Keelung

Names of fort	Level	Year of foundation
Gongzi Liao Fort	National Heritage	Founded in 1901~1924
Ershawan Fort	National Heritage	Constructed by Liu Mingchuan in 1886
Baimiweng Fort	National Heritage	Constructed in 1900~1904

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Figure 1. Vertical view of positions of some forts in Keelung City.

# Current situation

It is restored in recent years. It is based on remains preservation principle in order to maintain authenticity and completeness of historic interests.

Preservation is complete.

Military buildings are partially reconstructed; however, the scale can be relatively recognized; in recent years, the restoration is accomplished. It is based on remains restoration principle on the site to maintain authenticity and completeness of historic interests.

Names of fort	Level	Year of foundation	Current situation
Dawulun Fort	National Heritage	Constructed in 1901~1924	Gun platforms, bullet holes and ammunition depots are made of stone. Three arch cave military buildings are made by bricks and Cement. There are only walls and foundation beds remained in the military buildings. Maintenance of historic interests is practiced.
Shiqiuling Fort	Municipal Heritage	Constructed before 1884	West fort is currently and completely preserved. Only one gun platform and one ammunition depot remain. The forest is dense in the surrounding; middle fort is close to Shuyuan community and there are foundation bed of the fort and one command post remained. The preservation is acceptable; only ruins remain in east fort.
Sheliao Fort	Municipal Heritage	Constructed Liu Mingchuan in 1886; expanded in 1907; finished in 1924	Sheliao Fort is divided into eastern and western areas. Eastern area (originally company of electricity of Sheliao Island) is located on the eastern mountain of Sheliao Island. It is managed and maintained by the State Property Department of land manager. Nowadays, public visit is accessed; western military installations are located on the mountain at the back of Tian Xian Temple on Sheliao Island. At present, one stone made command post remains and it is managed and maintained by The Armaments Bureau of Ministry of National Defense of land manager. Nowadays, it is military control base and public visit is not allowed.
Dingshihge Fort	Municipal Heritage	Constructed Qing Dynasty in around 1889	Due to construction of school and road reconstruction of naval hospital, the original presence is damaged. Current situation relies on further restoration.

Names of fort	Level	Year of foundation	
Mushan For	Municipal Heritage	Constructed in 1900 and finished in 1902	

Source: Database management system of national cultural assets, Bureau of Cultural Heritage, Ministry of Culture.

# 2.2 Project of reconstruction of historical sites and fort restoration project

"Project of reconstruction of historical sites" in 2017 is prospect project of Ministry of Culture and it is included in maintenance program of historic interest, historic building and village sustainability and becomes governmental strategy of overall space of national cultural asset. Thus, historical sites respond to contemporary life. In field of "history and cultural asset maintenance development", by digital technology, people approach multiple historic memories. In addition, by sophisticated investigation and technical inheritance, cultural asset accelerates development of cultural and creative industry.

From Qing Dynasty, Dashawan District of Keelung was the place where the aboriginal Ketagalans lived. There were several wars. Forts and military installations in Dashawan District, including Dingshihge Fort, Ershawan Fort and Keelung fortress command, were included in "integrated project of reconstruction of historic sites in Keelung". Through different historic periods, by belt connection, it aims to describe history and culture and launches the possibility of narration of space. By the project, it integrated cultural and historic context, space and environment. It intends to operate charming and high-quality city and township environment by cultural asset centered spatial strategy and present human landscape of history and geography in Taiwan as classical cultural asset of national branding. However, the project tended to focus on historic scenes of reconstruction of historic and cultural value. Nevertheless, it lacked the study on natural and social value, particularly the public's cognition and use behavior of forts.

In investigation on provincial historic interests and forts in Keelung City and restoration project, by reuse strategy matrix analysis, it classified historic military buildings of different camps in fort area by three levels (A, B and C) of "workmanship", "fort design" and "regional culture" to reflect the degree of value of future reuse. By analytical table, it listed reuse strategies and valued brick and stone structure of forts, roof structure techniques and environment. However, it lacked the study on relationship with neighboring communities and positions of use.

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Current situation

Foundation bed is generally complete. However, it is partially damaged and only ruins remain.

## 3. Research Method

#### 3.1 Research Scope

Generally speaking, there are more hills and less plain in Keelung. The villages and population were mostly along the bank of Keelung Harbor and coastline; Shigiuling was the main borderline between urban district of Keelung and river valley. Since it lacked plains, most of residential areas in Keelung were constructed along the surrounding hills. Due to increase of population and declination of strategic position, the communities successively encircled the fort areas on the top of the mountain. Green land of forts, with the gradual declination of functions, became the parks in the neighborhood of communities.

Scope of this study refers to forts in the surrounding of Keelung Harbor and neighboring communities, including Gongzi Liao Fort, Dingshihge Fort, Shiqiuling Fort, Baimiweng Fort and Ershawan Fort; neighboring communities of forts include Shawan community (Gongzi Liao Fort, Dingshihge Fort), Shuyuan community (Shiqiuling Fort), Taibai community (Baimiweng Fort) and Ruchuan community (Ershawan Fort).

## 3.2 Data Collection

#### 3.2.1 Steps of investigation and interview

Research methods include literature review, investigation and interview. Steps of investigation and interview are shown below: (1) at the beginning, basic information refers to the latest aerial photograph/ satellite photo to identify positions of forts on the images, construct main locations of Keelung forts and collect related literatures of the forts. (2) Participation in workshop of community designers in Keelung and recognition of community designers in the surrounding of forts and community construction content, (3) Field survey and primary interview, visits guided by community residents, current situation recording of forts by photos and data collection, (4) in-depth interview with heads of the neighborhood or directors of community.



Figure 2. Visit in fort historic interest guided by local residents

# 3.2.2 Interview

It aims to explore local residents' knowledge about forts and community resources, and attempts to find use behavior of the forts of local residents or tourists and local identity of forts from community. Items of interview are shown in Table 2.

Item	No.	Questions
Gender	1-1	Male; Female
Age	1-2	How old are you?
Residential Place	1-3	Did you grow up in Keelung since childhood?
Residential Place	1-4	Have you worked in other cities and counties after being grown up?
Related Experience	1-5	Do you have any stories or memories to share with us?
Use of Effort	2-1	Do you know the forts in the surrounding? Have you visited them? How much do you know about them?
Use of Effort	2-2	What is the modern use of the fort?
History and Culture	3-1	How much do you know about the fort and history of the community?
Nature	4-1	Do you know any parks or green land in the neighborhood? Do you often rest, exercise or take a walk there?
	4-2	Do you know any plants in the neighborhood? Can you name them?
Society	5-1	Do you participate in activities held by community? What is the general content of the activity?
Value	6-1	What is the present value of the fort?
	6-2	In terms of history, do you think that the value of the fort has been changed? If the answer is yes, what is the value changed?
Local affection	7-1	Is the fort important to you?
	7-2	Do you feel proud of it?
	7-3	What is your affection or feeling toward the fort?
Local definition	8-1	For you, what is a fort? Is it a historic interest or something else?
	8-2	Do you consider the fort as a tourist site?
	8-3	Is it wonderful to have this fort in the community?

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Table 2. Items and categories of interview questions

Item	No.	Questions
Local attachment	9-1 9-2	Do you feel relaxed in the fort? Do you enjoy the overall atmosphere of the fort? (Is it new,exciting, enjoyable or nostalgic?)
Local Dependency	10-1	Have you participated in the activities in the fort? Do you like it? Why?
	10-2	What is the significance of the activities in the fort for the community?
Future Development	11-1	What do you expect from the fort and community in the future?



Figure 4. Photos of interview with local seniors

## 3.2.3. Data comparison and analysis

As to relationship between transformation of fort space function and surrounding residents' use behavior, this study conducts argument analysis. Content includes physical data (cultural value, natural degree, year, current situation, surrounding facilities and convenience of transportation of forts) and social data (current use, residents' use behavior, tourists' use behavior and identification with the forts). After field study, this study reorganizes data and the research team discusses and generalizes categories of functional transportation of forts, position of development and suggested reuse strategy.

# 4. Research Results and Discussion

## 4.1. Comparison of environments of forts

Gongzi Liao Fort, Dingshihge Fort, Shiqiuling Fort, Baimiweng Fort and Ershawan Fort are located in important strategic positions of Keelung. However, their physical environments are significantly different. In the following, according to on-site visit and interview, this studyv compares construction years, measure of area, distance from neighboring communities and current situations of forts (Table 3).

Original use of forts referred to military defense. They were mostly constructed from the end of the 19th century to early 20th century. Among five forts, in terms of the measure of area, Gongzi Liao Fort was the largest and Ershawan Fort and Baimiweng Fort were the second. Dingshihge Fort and Shiqiuling Fort were smaller than 1,000 square meters; as to distance from neighboring communities, Baimiweng Fort was the closet and Gongzi Liao Fort was the most remote; as to natural degree, preservation of Gongzi Liao Fort and Ershawan Fort was the most significant, Baimiweng Fort was the second and Dingshihge Fort was the least; Shigiuling Fort included three forts. Middle fort was close to the community with more manmade facilities. Eastern and western forts were remote from community and the natural degree in the surrounding was significant; as to convenience of transportation, Gongzi Liao Fort, Dingshihge Fort and Ershawan Fort were accessible by cars. Transportation of Shiqiuling Fort and Baimiweng Fort were medium. As to eastern and western forts of Shigiuling Fort, they were not easily accessible by buses, motorcycles or bikes. Peope should even visit them on foot.

# Table 3. Comparison of environments of five forts

	Gongzi Liao Fort	Dingshihge Fort	Shiqiuling Fort	Baimiweng Fort	Ershawan Fort
Level of heritage	National heritage	Municipal heritage	Municipal heritage	National heritage	National heritage
Construction years	Constructed in 1901~1924	Constructed in around 1889	Constructed before 1884	Constructed in around 1904	Constructed before 1841
Location	It is located on the top of mountain of Gongzi Liao, southwest of Bisha fishing port	It is located on the top of Xuqiu mountain, east of Keelung Harbor and at the bottom of entrance of Cheng-Bin Junior High School of nowadays.	Middle fort is located on the top of Keelung end Daye Tunnel of National Highway No.1; east fort is located on the mountain of Shiqiuling; west fort is located on the mountain of Shiqiuling.	It is located on the hill next to Hsieh-ho Power Plant on the west of Keelung Harbor.	It is located on the top of Ershawan on the east of Keelung Harbor
Distance from neighboring community	Linear distance from neighborhood office of Shawan community is around 1.67 km.	Linear distance from neighborhood office of Shawan community is around 465 meter.	Linear distance from entrance of Shuyuan community is around 325 meter.	It is located on the top of mountain of Taibai community.	Linear distance from entrance of Ruchuan community is around 390 meter.
Measure of area	128,920 m²	598m²	167 m²	6,000 m²	93,000 m²
	There are three levels: the bottom is Ying Pun area. According to speculation, it is the location of the	Since it has been idled and neglected, in the whole fort, gun platforms and the connected military rooms and channels	Present remains of Shiqiuling Fort include gun platforms, ammunition depots and command post. In parapet wall in front of	Present ruins of the fort include command post, four gun platforms and observation platform. There are	Ruins of the fort includes city gate "Haimen Tianxian". Two sides of the city gate are city walls. Battlements are

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tary rooms in untain wall. In fition, between ervation platform d gun platform a, there is mmunication hole" d it is one of the irracteristics. ecent years, toration has been shed. On the site, it	Due to construction of school and road reconstruction of	arched roof on the top. Exit is installed on south side. There are two lines of arched gate hole. Wall of ammunition depots in the middle is solid and thick to prevent the attack of firearms. Western fort is currently and completely preserved. However,	ancient fort in Taiwan. Restoration is accomplished in recent years and it	be monitored. Nowadays, interior space does not exist in the whole fort area. Restoration is accomplished in recent years and it
preserves and maintains the original situation to remain authenticity and completeness of historic interests.	Tri-Service General Hospital Keelung Branch, the original situation is damaged. Current state is inferior and it relies on further restoration.	only one gun platform and one ammunition depot are remained. The forest in the surrounding is dense. Middle fort is the closet to Shuyuan community. There are fort foundation bed and one command post and the preservation is	remains the original situation of the field to maintain authenticity and completeness of historic interest.	remains the original situation of the field to maintain authenticity and completeness of historic interest.
Hillside fields are mostly in the	Surrounding facilities include Tri-Service	acceptable; there are only ruins in eastern fort. Middle fort includes a small pavilion and	In the surrounding, there are Hsieh-ho	In the surrounding, there are Keelung

Yizheng Park,

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vegetation is dense. and road of entrance meeting place; in the park of Taibai

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surrounding of eastern and western forts, there are no related facilities.	community and civil buildings of Taibai community.	monument of 228, dazzling path and main road of east coast of Keelung Harbor.
Middle fort is the closest to community and there are many manmade buildings. Natural degree is medium. Eastern and western forts are remote from community and natural degree is high.	In the surrounding of the fort, except for southern community, vegetation on the east and west is dense. Weeds are everywhere and need maintenance; the north is sea cliff which faces courses of Keelung Harbor area. Natural degree is high.	Vegetation is dense and it is well maintained. Natural degree is high.
Transportation of middle fort is relatively convenient. Visitors can ride the motorcycle or reach the place on foot; transportation of eastern and western forts is less convenient and visitors can only arrive at the place on foot.	Transportation is relatively convenient. Visitors can arrive at the place by car or motorcycle. However, buses cannot access to the fort. The slope is steep and it cannot be accessible by bikes.	Transportation is highly convenient. It is accessible by car and on foot. Even buses can access the main roads. Besides, there are hiking routes as connection.

Source: Compiled by this study.

#### 4.2. Socialized transformation of military facilities

Functions of forts change with time and social progress. The forts are differently developed according to factors such as history and geography. During the period of war, Keelung forts served for military affairs and the locations of forts were based on the concern of military defense. In the surrounding, there were mostly no residents and communities. With the end of the wars, forts were transformed into historic interests with manufacturing techniques, architecture technology and historic value. Some of them served as tourism and community parks. Because of different locations, historic development and relationship with community, the forts developed different situations and functions. For instance, Gongzi Liao Fort mainly serves as tourism of historic interest and the recreational purposes are mainly outing, mountain climbing and sightseeing. Most of the visitors arrive in the mornings and evenings of holidays. At night, since there is no lighting, there are almost no visitors. Dingshihge Fort is currently a historic interest which has been idled for long time. Besides, the location is secret and it is difficult to discover the place. There are almost no visitors. Middle fort of Shigiuling Fort is currently both historic interest and community sports park. Next to the fort, there is early meeting. In the morning, residents exercise near the fort and some activities are held around the fort. Eastern and western forts are idled; Baimiweng Fort serves as both tourism of historic interest and community sports park. Residents tend to exercise in the fort. On the holidays, in the evenings, numerous tourists appreciate sunset and seascape by the fort. Ershawan Fort mainly serves as tourism of historic interest and there are few tourists. (Table 4)

	Gongzi Liao Fort	Dingshihge Fort	Shiqiuling Fort	Baimiweng Fort	Ershawan Fort
Current use	Tourism	Idling historic interest	Tourism, ecological conserve, community park	Tourism, community park	Tourism
Residents' use behavior	Community activity of mountain cleaning passes the fort.	Community residents rarely use this fort.	It is community sports park. In few activities, participants start off or take a break in this place.	It is community sports activity. Many residents take their children to play in the park next to the fort. On the greens of the fort, residents can play and have a picnic.	It is recreational and sports place for residents.
Tourists' use behavior	Tourists mainly visit the place on holidays, including family mountain climbing and	Tourists mostly visit the historic interest. However, since the location is secret and it is difficult to	It includes mountain climbing, night scene watching, etc. Tourists mainly visit the place on holidays	They mainly visit the place on holidays and they mostly appreciate the seascape and historic interest. In fort	They mainly visit historic interest.

Table 4. Comparison of socialized transformation of military functions of five ports

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landscape watching. It is generally 8-9 am and 4-5pm. There is no lighting; there	discover the place, there are few tourists.	during the periods of 8-9 am and 5-6pm.	area, there are long benches for visitors' rest; tourists mostly visit the place in the afternoons around 4~6	
are almost no			o'clock.	

# 4.3. Relationships between forts and community activity

According to the interview, this study realizes that local affection or preference of heads of the neighborhood or directors of community development associations toward forts in the communities are different. It is demonstrated in relationship between community activities and the forts. According to importance degrees in different areas, there are different responsive strategies.

In Shawan Li which locates Gongzi Liao Fort and Dingshihge Fort, there are extremely abundant historic resources. Besides the forts, it also includes Xugiu Command, Keelung Fortress Command, etc. Currently, in Shawan Li, the main activity is the care for the elderly. Sometimes, mountain cleaning or hiking passes the forts. At present, relationship between community and the forts is not close. However, there is still historic significance. Head of the neighborhood has the intention to be the guide to explain community cultural resources to visitors. The community expects the development of tourism or creative and cultural industry of the forts or historic remains in the community. They can serve as the branches of Keelung cultural center and hold frequent exhibitions or concerts in order to enhance community residents' use.

Director of community development association near Shigiuling Fort is proud to see Shigiuling every day and be one of the residents of Shigiuling. The director enjoys and has intention to spend most of time on community affairs. At present, among Shigiuling Fort, only middle fort serves for residents' daily exercises, dance or activities. The rest two forts are idled and the community cannot use them. Activities of Shuyuan community are generally environmental. Community volunteers arrange the environment, cultivate the plants and vegetable gardens, take care of the elderly and form environmental bands. It is an active community. Although fort is not the main concern of the community, they are proud of having the first mountain in Keelung and Shiqiuling Fort which is the best place to overlook Keeluna.

Baimiweng Fort is located at the top of Taibai community and children's playground and recreational green land is next to it. In daily time, it is where community residents exercise and on the holidays, tourists appreciate seascape in this place. Head of the neighborhood is extremely proud of Baimiweng Fort in the community and prefers overall atmosphere of the fort. However, the head is not satisfied with governmental restriction of business behavior and suggests the liberation of use limitation of the fort. Baimiweng Fort can be transformed into tourist site such as Jiufen. The head expects the improvement of transportation, permission of stand installation and reinforcement of tourism marketing.

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Since most of community residents are the elderly, the activities are based on care for the old people, such as dance or visit. The head of the neighborhood pays attention to local seniors' verbal historic record regarding the fort and states that knowledge of many young people in the community about Baimiweng Fort is almost from the seniors' verbal narration of generations instead of books are network.

Activities in Ruchuan Li where locates Ershawan Fort include community guards, volunteer promotion, etc. Although the scope of activities does not include the fort, the head of the neighborhood argues that fort area is an important recreational space and overlooking the seascape from the top is particularly relaxing. The head states the positive value of the fort to the community and expects that in the future, the fort can be developed with the neighboring Zhongzheng Park and Yizheng Park in the condition with sufficient parking space.

#### 4.4 Reposition and spatial patial patial patial patial strategy of trategy of ford

Original use of forts refers to military defense and the purpose is to defend Keelung Harbor from the battles. Thus, at the time, Keelung Harbor was critical military harbor in Taiwan. Preservation of Gongzi Liao Fort, Baimiweng Fort and Ershawan Fort is the most complete and they are national historic interests. Therefore, every year, the government plans budget for restoration and preservation of the fields. The whole areas are properly maintained. On the contrary, preservation of Shigiuling Fort and Dingshihge Fort is inferior. Weeds in the surrounding grow everywhere and measure of fort area is relatively small. Many facilities are not restores and currently they are mostly idled.

Integrating value of culture, environment and social connection of the forts, this study classifies transformation of forts into three categories. The first category refers to "tourism", cultural and natural resources are extremely abundant. Hinterland area is vast and there are tourism service facilities, such as Gongzi Liao Fort and Ershawan Fort. The second category is combined with "tourism and community". There are valued cultural and natural resources. The measure of area is large and the place is close to community, such as Baimiweng Fort. The third category is "community and conservation". The resources are common, measure of area is small and it is mainly based on community residents' use and conservation, such as Dingshihge Fort and Shigiuling Fort.

Forts of the first category can be combined with urban tourism development system in Keelung. At present, what Gongzi Liao Fort and Ershawan Fort require the most is not the increase or improvement of facilities. It should develop tourist itineraries and services according to characteristics of forts and enhance marketing in order to strengthen reputation of forts. Baimiweng Fort of the second category is close to community and the relationship with community is significant. However, tourism on holidays is popular. Thus, it should balance tourism and community to result in win-win state. It can also improve transportation or liberate the business to develop new opportunities for forts. As to the third category, due to lack of space or inconvenient transportation, tourism cannot be developed. However, it can focus on community and conservation, reinforce connection between the forts and communities, investigate surrounding natural resources of forts and conserve natural environment. In addition, it should increase opportunities for the community to approach the forts and the surrounding and reinforce affection of community to forts.

Thus, the projects correspond to different resources in order to propose the most appropriate planning for forts and communities, reinforce their relationship and strengthen community residents' local affection to forts to participate in guide services and preservation affairs of forts.



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Figure 5. Gongzi Liao Fort Site Plan



頂石閣砲臺全區平面圖 **Dingshihge Fort Site Plan** 









柳球嶺東北台寺社區活動中心

Figure 7. Shiqiuling Fort site plan



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獅球嶺砲臺全區平面圖 Shiqiuling Fort Site Plan



Figure 9. Ershawan Fort Site Plan

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# From Preservation to Imagination: The Distortion of Hilly Cityscape in Hongyadong Area, Chongqing, 2000-2005

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# ABSTRACT

Few researches of Chinese urban history study the interaction between urban construction and hilly landscape at micro level by focusing on specific urban projects. This paper traces the process of the renovation of a typical hilly vernacular settlement-----Hongyadong area in Chongging city, from 2000 to 2005.

As a vernacular settlement on the riverfront slope of Chongging, Hongyadong area was characteristic of its riverfront hilly features including hilly street network, hilly vernacular buildings, the rear cliff, and the corresponding everyday life of local residents. After renovation, Hongyadong area was promoted by official media as a representation of the riverfront hilly cityscape of past Chongqing. However, this paper discovers that during renovation the riverfront hilly features of Hongyadong area were distorted, especially after a real estate developer participated in the project, including the removal of local residents, the deformation of original street network, and the disappearance of rear cliff. The paper argues such distortion reflects the shift of the project, from preserving the authentic riverfront hilly vernacular cityscape, to constructing a hilly spectacle catering to the popular imagination of Chongging in an exaggerated way. Such change was mainly due to the impact of capital on preservation in the unique political-economic context of contemporary China: no matter how arbitrarily the power of capital attempted to interfere preservation, once it was tolerated by governmental forces, it would be difficult for other groups to resist such impact, due to weak civic power.

Keywords: Vernacular Settlement Renovation; Hilly Cityscape; Hongyadong Area; Chongging

### 1. INTRODUCTION

Hilly cities distinguish themselves in many senses from plain cities, but few studies on Chinese hilly cities depart from historic perspective, especially at micro level. Tracing the process of specific urban projects can help reveal new historic facts that could not be touched upon otherwise by urban history research at macro level. This paper traces the process of a renovation project of a typical hilly vernacular settlement in a typical Chinese hilly city: Hongyadong area in Chongging city, and discusses the changing attitude of urban construction towards traditional hilly cityscape, and the reasons behind it.

## 2. HONGYADONG AREA BEFORE RENOVATION

Hongyadong area is located on the slope at the riverfront bank of Jialing River against a rear cliff, and its topographic elevation difference exceeds 50 meters. Before renovation, Hongyadong area was a vernacular settlement highly representative of the traditional riverfront hilly cityscape of Chongging. As a dock area, it thrived since 1920s with the flourishing waterway transportation in modern Chongging (He, 2010, p. 26), during which the settlement grew on the riverfront slope. After conventional waterway transportation in Chongging declined, it gradually decayed into a slum (Fig. 1).



Jialing Riverfront Road Jialing River Bank Fig. 1. Hongyadong Area before Renovation

Source: Yang, Qinchuan. (2007). The Track Study on Urban Human Settlements construction in Chongging in the Past Decade (1997~2007): Preservation of Historic Culture. Chongging University Master's Dissertation. p. 58; additional illustrations by author

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#### **3. RENOVATION PRINCIPLES**

On 30th May 2000, in preparation for renovation, the government and Sichuan Fine Arts Institute coestablished a research team to investigate the area (Chongging Liang Jiang Yan Xian Zong He Zheng Zhi Kai Fa Ban (Chongqing Yangtze and Jialing Riverfront Area Comprehensive Renovation and Development Office) and Sichuan Fine Arts Institute, October 2000, p. 4). The outcomes of investigation were compiled into a report: Chang Jiang Liu Yu Chongqing Hongyadong Shan Di Jiu Cheng Feng Mao Qu Bao Hu Xing Kai Fa Ke Yan Bao Gao (Research Report of the Proposed Protective Development of Hongyadong Area, Chongging, hereafter abbreviated as Research Report), which shows how the research team understood the features of the traditional riverfront hilly cityscape of Hongyadong area:

Firstly, according to Research Report, with the clear presence of the hilly slope and rear cliff, Hongyadong area was representative of the riverfront slope topography of Chongging (Ibid., p. 36). Secondly, Research Report addressed the original street network of Hongyadong area as a crucial feature of traditional riverfront hilly cityscape, which consisted of three horizontal streets and eight stair streets. The horizontal streets were constructed at different elevations but all in parallel with topographic contour lines, including Zhiyanhe Street, Tiancheng Lane and Hongyadong Street. The stair streets were perpendicular to contour lines, and linked horizontal streets of different elevations together, formulating a street network. Such stair streets recorded the prosperity of the waterway transportation of past Chongging (Ibid., p. 38): Before the decay of waterway transportation, many stairways were built to depart from ferry sites and ascend uphill traversing urban blocks. Such stairways provided the flow of goods and people between the urban areas uphill and ferries downhill, and hilly vernacular buildings gradually grew along the stairways, turning the stairways into streets that bred diverse urban life. Therefore, the original street network was the representation of both the hilly feature and the waterway transportation tradition of Chongging (Ibid.) (Fig. 2-3).





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Furthermore, Research Report investigated existing vernacular buildings within the site, and summarized their adaptation to hilly topography as "clinging to rocks", "standing on stilt", and "overhanging upper structures" (Ibid., p. 39) (Fig. 4).

For "standing on stilt", some vernacular buildings partly stood on stilt columns to detach from the lower ground. Such approach adapted to complex topography as it could reduce the transformation of original hilly topography and simplify construction work (He and Guo, 2001, pp. 63-64). "Overhanging upper structures" referred to overhanging part of the structures of upper floors to expand interior space. Since urban construction in hilly areas often faced land shortage, such approach adapted to hilly topography by creating additional building space (Ibid., p. 63). "Clinging to rocks" referred to attaching vernacular buildings to steep slopes or cliffs, which could take full advantage of hilly topography for building construction (lbid., p. 64).

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Fig. 3. The Section of Hongyadong Area before Renovation



Fig. 4. "Standing on Stilt" (Upper), "Overhanging Upper Structures" (Middle) and "Clinging to Rocks" (Lower) Source: He, Zhiya. (2010). The Old Cities of Chongqing, Chongqing: Chongqing Press. p. 27 (upper left and middle left); provided by Chongging Urban Construction Archive (lower left); drawn by author (upper right, middle right and lower right)

In short, the features of traditional riverfront hilly cityscape in Hongyadong area involved slope topography (especially the rear cliff), street network, and the adaptation of vernacular buildings to topography. Accordingly, Research Report advised to preserve the rear cliff, the original street network, and inherit the typical patterns of vernacular buildings in terms of their adaption to topography (Chongging Liang Jiang Yan Xian Zong He Zheng Zhi Kai Fa Ban (Chongging Yangtze and Jialing Riverfront Area Comprehensive Renovation and Development Office) and Sichuan Fine Arts Institute, October 2000, pp. 36-42). Research Report also advised to maintain part of local residents to preserve the original everyday life practice corresponding to the riverfront hilly vernacular settlement (Ibid., p. 48). However, as few local residents hoped to stay in Hongyadong area (Ibid., p. 24) due to poor living conditions, the government finally relocated all of them.

To restrain development intensity, Research Report proposed the plot ratio (0.850), the building height limit (maximum 10m) and the total floor area (18752.02m2) for renovation (Ibid., p. 57). According to the research team leader Hao, Dapeng, a professor of Sichuan Fine Arts Institute, such indices were established to prevent the scale of proposed built structures from far exceeding that of original settlement (Hao, 23rd February 2017), which could prevent traditional hilly cityscape from distortion.

## 4. THE TRANSFER OF DEVELOPMENT RIGHTS

After establishing renovation principles, the government invited bids for design scheme and project development rights. Sichuan Fine Arts Institute won the bid for design (Chongging Architectural Design Institute, 24th September 2001, p. 12), and a developer Cygnet won the bid for development rights (Ibid., pp. 13-14). The transfer of development rights from government to developer was a turning point of the renovation process.

#### 5. THE BID-WINNING DESIGN

After winning the bid, Sichuan Fine Arts Institute amended the design scheme repeatedly (Ibid., p. 12). The following analysis of the bid-winning scheme is based on a set of design documents produced during the amendment in 2002, after Cygnet was already involved. The bid-winning scheme followed the principles established in Research Report, with partial adjustment. The scheme maintained the rear cliff (Fig. 5) and the street network (Fig. 6-7). The individual building design inherited the strategies of "clinging to rocks", "overhanging upper structures" and "standing on stilt" as well.

However, the logic behind the application of "standing on stilt" in the scheme was distorted. Originally "standing on stilt" was applied to detach the deck from the sloping ground to minimize the transformation of topography, and the spaces beneath the elevated deck were usually unused. But in the scheme, the sloping ground beneath some buildings "standing on stilt" was already transformed into terraced ground, and the spaces beneath the elevated deck were designed to be used similar to interior space (such as shops), except that they were temporarily not blocked by exterior walls. This phenomenon seems to reveal the impact of capital on preserving regional culture: the scheme distorted the logic behind "standing on stilt" to acquire more floor area.

Another fact implying the impact of capital was the increase of total floor area to 36740m2, considerably higher than 18752.02m2 advised in Research Report. However, Cygnet was not satisfied.



Fig. 5. The Model of Bid-winning Scheme Source: provided by Sichuan Fine Arts Institute



Fig. 6. The Master Plan of Bid-winning Scheme Source: provided by Sichuan Fine Arts Institute



Fig. 7. The Section of Bid-winning Scheme Source: provided by Sichuan Fine Arts Institute; additional illustrations by author

# 6. THE CHANGE OF DESIGN TEAM AND THE NEW SCHEME

On 11th June 2003, the government held a meeting discussing Cygnet's request for adjusting the scheme, and approved it (Chongging Urban Planning Bureau, 20th June 2003, pp. 1-2). On 25th November 2003, the government proposed to construct a light rail bridge across Jialing River, which would traverse the eastern part of Hongyadong area. On 2nd December 2003, Chongqing Urban Planning Bureau required Cygnet to revise the design scheme to avoid conflict with the bridge (Chongqing Urban Planning Bureau, 2nd December 2003). However, Hao, Dapeng, the project design leader, refused to further increase floor area during subsequent revision (Hao, 23rd February 2017), as it would distort the inheritance of traditional cityscape. So Cygnet invited Shenzhen Huazhu Gong Cheng She Ji You Xian Gong Si Chongging Fen Gong Si (The Chongqing Branch of Shenzhen Huazhu Architectural & Engineering Design Ltd., hereafter abbreviated as Huazhu) to produce a new scheme. This scheme increased the floor area to

49955m2, and triggered a series of changes:

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Firstly, to occupy more land for building construction, the cluster of buildings representing the group form of vernacular settlement merged into one giant building with multiple layers of roofs, distorting the original street network: on the one hand, almost all the stair streets were effaced; on the other hand, for horizontal streets, Tiancheng Lane was elevated to the rooftop of the building, while Hongyadong street was shaded by the upper floors of the building, turning itself into a dark corridor lack of street life (Fig. 8-9). The second was the increased building height. In Huazhu's scheme, the building reached 12 floors, which blocked the rear cliff rather than preserving it (Fig. 9).









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Fig. 10. The Renovated Hongyadong Area based on the Design by Huazhu Source: https://c2.staticflickr.com/6/5256/5418618086\_01ecb79865\_b.jpg

In 2006, Huazhu published an article introducing the design scheme. The introduction compared the design to "the spectacular castle in Spirited Away" (Shenzhen Huazhu Gong Cheng She Ji You Xian Gong Si Chongqing Fen Gong Si" (The Chongqing Branch of Shenzhen Huazhu Architectural & Engineering Design Ltd.), 2006, page number unknown), which referred to a fictitious bathhouse in the famous animated movie. However, this bathhouse was not only an exotic cultural production, but also an individual giant high-rise building with multi-layered pitched roofs rather than a group of vernacular buildings. Such comparison seemed to indirectly admit that the design scheme had distorted the original cluster form of Hongyadong area. However, linking the design to this widely known movie could be an effective strategy of raising the public exposure of the project.

Such linkage seemed to reflect that the new design scheme had a weaker interest in inheriting the authentic hilly cityscape of Hongyadong area, than in turning Hongyadong area into a hilly spectacle.

On 30th April 2004, Urban Planning Bureau of Chongqing basically approved the new design scheme (Chongging Urban Planning Bureau, 30th April 2004), although it did not conform to the principles established in Research Report in multiple aspects.

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Shortly before the completion of renovation, professor Hao, Dapeng and professor Wang Lin from Sichuan Fine Arts Institute who participated project design expressed regret over the result of renovation due to the loss of authentic traditional hilly vernacular cityscape. As Wang Lin commented, "If the government had enough funding, it would not have invited bids (for project implementation); if no developers were involved via the invitation for bids, probably the result of renovation could have been different." (Wu, Yang and Li, 13th July 2005, section 4)

After the completion of renovation, Hongyadong area frequently exposed itself in Chongging's promotional videos, and became a popular tourist attraction. The controversial process and result of renovation did not hinder Hongyadong area from representing the regional culture of the city in official media.

### 7. CONCLUSION: FROM PRESERVATION TO IMAGINATION

During renovation, the elements distinguishing Hongyadong area as a riverfront hilly vernacular settlement were gradually "filtered". In the beginning, the street network, the rear cliff, the stilted buildings, and the corresponding everyday life practice of local residents, were all supposed to be preserved. Then, due to the contradiction between preservation and the request of local residents for better living conditions, local residents were relocated elsewhere, excluding the everyday life practice from preservation. After the developer Cygnet was involved, due to increasing demand for commercial interest (in other words, the impact of the power of capital), the rear cliff and the original street network were excluded as well, since preserving them would conflict with the pursuit of maximum profit.

In the unique political-economic context of contemporary China, due to weak civic power, it would be difficult to restrain the impact of capital once it was tolerated by governmental forces. Therefore, it is not surprising such power could break the rules and principles standing in its way to the pursuit of maximum profit, and finally transformed the renovation of Hongyadong area from preserving authentic hilly vernacular cityscape to constructing a hilly urban spectacle, a surreal image. Such image catered to the popular imagination of Chongqing as a hilly city in an exaggerated way, and satisfied the demand of the city for spectacular tourist attractions as part of city-branding strategy and tourism development, which explains why Hongyadong area was still promoted as a carrier of the regional culture of Chongging in official media after renovation.

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### ABSTRACT

Sacred Groves are fragments of heavily wooded landscapes which are protected by cultural beliefs and customs by the local community. Sacred Groves in Kerala are classic examples of ecological conservation through generations of the community. The genesis of sacred groves in Kerala is primarily linked to the ancient system of worshipping of forces of nature. They play an important role in the ecological balance of the region with no human intervention permitted within the limits. These pristine patches of vegetation are often the only remnants of the endemic floristic diversity of the region. They act as bio-gene pools of the original endemic vegetation of the region.

Over the past few decades, Kerala has witnessed a drastic reduction in the number of its groves owing to changes in the socio-economic changes and a paradigm shift in people's perception towards them. There is a need to protect the sacred groves due to their eco-cultural importance. The study deals with understanding the genesis, eco-cultural values and issues faced by the sacred groves. It attempts to identify possible ways in which sacred groves can be protected.

Keywords: Sacred Groves; Kaavu; Eco-cultural Landscapes; Cultural Ecology; Kerala

### 1. INTRODUCTION

The human attitude towards nature has evolved over time. The primitive hunter gathering groups revered nature. Nature worship has often been attributed for the shaping of the human attitude towards nature conservation and sustainable utilisation of resources. A direct manifestation of this is the presence of 'Sacred Groves' around the world.

Sacred groves are fragments of heavily wooded landscapes protected by cultural beliefs, taboos and customs of the local community. They usually consist of multi species, multi tiered patches of primary forests maintained in a relatively undisturbed condition for centuries. They are an expression of the relationship of humans with the 'divine' or with nature (Hughes and Chandran, 1988).

# The Garden of the Gods: Ecological Significance of the Sacred Groves of Kerala

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In India, they are found in patches of varying areas adjacent to or within human settlements ranging from the Himalayan highlands in the north to the coastal plains in the south. Their distribution and numbers vary in the various states; however their basic cultural connections remain the same. Although, there have been no comprehensive studies on documenting all the sacred Groves at a nationwide scale, the numbers as per researchers are estimated to be in the range of 100,000 -150.000.(Malhotra.1998)

Sacred Groves in the state of Kerala are often associated with household family deities, Temple complexes or local deities. They are known as 'Kaavu'- in Malayalam, the language spoken in the state. Tree spirits and serpents were traditionally worshipped in Kerala and the sacred groves were considered to be abodes of them. According to Chandran et al. (1998), the history of Kerala may be traced back to hunting gathering societies, who attributed sacredness to patches of forests within their territory as a mark of respect.

Over the past few decades, Kerala has witnessed a drastic reduction in the number of its groves. Sacred groves need to be preserved and their importance recognised since they are relic patches of biodiversity which have a positive impact in maintaining the health of the regional ecosystems.

### 2. GOALS AND OBJECTIVES

The main objectives of the paper are:

- To understand the genesis, eco-cultural connotations and characteristics of the 'Kaavu'- the a. sacred groves in Kerala.
- To understand their ecological value and establish its contemporary relevance. b.
- To address the issues faced by sacred groves. C.
- To explore possible ways in which they can be protected. d.

### 3. BACKGROUND

### 3.1. Kerala: The Land Sandwiched Between the Mountains and the Sea

Kerala state situated in the southern part of the Indian Peninsula covering an area of 38,863 sq. km. is sandwiched between the Western Ghat Mountain ranges on its east and the Arabian Sea on the West. These two great geological formations have been responsible for shaping the geo-climatic environment of the state. The state experiences humid equatorial tropic climate.

### 3.2. Kaavu: The Genesis

Geological and Mythological findings: Geological studies have concluded that a substantial portion of Kerala may have been under the sea in ancient times. Marine fossils have been found in areas uphill supporting the hypothesis. (Menon, 1967).

It is interesting to note that the mythological view of the genesis of Kerala in the popular eco folklore is that the land strip of Kerala was recovered from the sea by the axe-wielding warrior sage Parasurama, considered to be the sixth of the ten avatars(incarnations) of God Vishnu. Parasurama threw his axe across the sea, and the water receded as far as it reached. The land however was salt laden and unsuitable for habitation; so Parasurama invoked the great Serpent King Vasuki, who with his snake clan nullified the salinity and rendered the soil fertile. Out of respect, Vasuki and all snakes were appointed as the protectors and guardians of the land. This popular eco-folk lore captures the sentiment behind the attribution of sacredness to snakes and the possible designation of sacred groves in Kerala.

It has been an age old practice in Kerala to set apart a portion of the land near the house as an abode to the serpents and for rehabilitation to those animals and birds which may be displaced by the construction activity. Joint family system was prevalent in Kerala. Before the construction of a new house, it was a ritual to request permission to do so from the reptiles and other animals living in the precinct. This ritualistic process was a long one. Navadhanyas (a collection of 9 different pulses and seeds-rich in protein and known to germinate fast) were sown in the patch of land designated for the construction. They were allowed to germinate and feed the birds and animals. The avifauna is then requested to shift to an adjoining patch of land designated for their rehabilitation.

These zones are then preserved as sacred groves. This was an ecologically charged practice prevalent in Kerala which may seem absurd to many in the contemporary times. But the real gist of the ritual is in the fact that destruction of nature for one's own benefit was not seen as a reckless activity but rather as one which has to be carried out responsibly. The house owner was made responsible for not just the shelter of his kith and kin but also for all the organisms inhabiting his plot of land.

The presiding deity of the sacred grove was usually the family Gods or the Serpents. Hence the name 'Nagakkavu' or 'Sarpakkavu'. Many sacred groves have more than one deity, the patron deity and two or more supporting deities. The sacred groves of North Kerala are mostly associated with Goddess whereas the sacred groves of South Kerala are associated mostly with snake worship. (Anupama, 2009)

### 3.3 Morphological Aspects of Kaavus:

Sacred Groves owned by households have a perimeter measurement which is equivalent to the adjacent 'Tharavadu' (Traditional House). They are usually located in the south western portion of the site keeping sufficient distance from the residential building. Many of these household sacred groves are less than 200 sq.m in area

Sacred groves associated with temples or community owned sacred groves are much bigger. Iringole Kaavu, a sacred grove in central Kerala is over 50 acres in area (approx. 202350 sg.m.). Sacred groves usually have a raised platform in the centre or at one of the cardinal directions called the 'chitrakootakallu' with carved stone idols of Serpent deities arranged on them.

In some groves, trees like Ficus religiosa, Ficus bengalensis, Alstonia scholaris, Strychnox nuxvomica, Mimusops elengi, Caryota urens etc are represent the deities.

The groves are preserved with an attitude of minimal intervention. Nothing is broken, cleared or taken away from the Kaavu unless for medicinal purposes. The floor is neither swept nor cleared of the leaf litter. This ensures a heavy built up of micro nutrient rich humus on the grove floor.

### 3.4. Rituals Associated with Sacred Groves:

A number of art forms and rituals are associated with the sacred groves in Kerala. These are displays of the primordial connections of culture with nature. The ritual of offering 'Nurum paalum' (a concoction of rice powder, turmeric powder, lime, cow's milk, tender coconut water, mashed ripe bananas and ghee) is an important offering to the snake gods.

The art of drawing the 'Sarpakalam' - a sacred diagram drawn on the floor (which has been thinly plastered with a paste of fresh cow dung and mud) depicting the Gods and cosmic symbols is also an important ritual in sacred groves. The colours used are nature derived - crushed rice for white, powdered charcoal from the burned paddy husk for black, powdered green leaves for green, red coloured sand for red and turmeric powder for yellow. The ritualistic devotional dance called 'sarpamthullal' to propitiate the serpent God is also performed.

'Theyyam'(also known as 'Kaliyattam'), is a centuries-old ritual performance associated with sacred groves of North Malabar(Northern part of Kerala). It is reminiscent of a rich tribal culture which worshipped the forces of nature. The elaborate makeup, towering headgear and costumes for the performance are designed to instil awe in the minds of the viewer. The performances often take place late at the night.

### 4. ECOLOGICAL SIGNIFICANCE OF SACRED GROVES

### 4.1 Biodiversity

Amongst the 3 physiographic divisions of Kerala, the western highlands house the tropical moist deciduous forests and montane rain forests. The other two physiographic divisions -the central midlands and the coastal plains were once covered by tropical moist broadleaf forests often referred to as the 'malabar coast moist forests'. But this ecoregion has almost been cleared for agriculture and habitation. Most of Kerala's urbanisation and agricultural garden lands are situated in this ecoregion. (Rodgers and Panwar, 1988). Kerala being a narrow strip of land, the population density is very high (860 persons per square kilometre which is three times as densely populated as compared to the national average) (Censes of India, 2011). It is interesting to note that most sacred groves are located in this ecoregion. The sacred groves are the last remnants of the primordial 'malabar coast moist forests'.

They represent the climax stage of vegetation which tends to be richer in species diversity than the other stages of its ecological succession. This is evident in the number of species of plants growing in multi-tiered layers including trees, shrubs, herbs, stranglers, lianas, epiphytes and parasites. (Rajendraprasad, 1995). A floristic documentation of 364 sacred groves cumulatively amounting to just 1.44 sq.km showed that they contained 720 species of angiosperms belonging to 472 genera. (Induchoodan. 1996)

The vegetation of this ecozone has a high number of endemic species (Endemic species are plants and animals that exist only in one geographic region). Sasidharan (2004) documented 4679 species of flowering plants from Kerala of which 1637 are considered endemic. Many of these are believed to have been lost in the rampant clearing for agriculture practiced for centuries of habitation (Induchoodan & Balasubramanyan, 1991). Most sacred groves harbour and protect numerous endemic species which are on the verge of being endangered or being extinct.

Syzygium travancoricum, an endemic species, labelled critically endangered in the IUCN Redlist is found in a few sacred groves in the state. The species has been almost wiped off from its original habitats. The tree prefers swampy wetland habitat which has been widely drained and converted into paddy fields (IUCN RedList, 1998).

Sacred groves provide refuge for a number of avifauna. Traditionally, Kerala has had an agrarian economy, with rice being the staple food of the people. Any loss due to climatic vagaries or due to rodent induced famines could mean detrimental to the economy. The presence of sacred groves (which provided effective refuge to the snakes and to the birds of prey) close to paddy fields and habitation units (where the harvested grains were stored) was an effective strategy in keeping a check on the pest rodent population.

The microorganisms responsible for breaking down the leaf litter to the basic essential nutrients and release into the soil are abundant in the sacred groves. Many beneficial soil dwelling organisms flourish in these conditions which may be absent in the ploughed soils of the adjoining paddy fields.

### 4.2 Contribution to the hydrological cycles

Numerous modern day studies have established the role of sacred groves as mini watersheds for the local hydrology. An age old Malayalam proverb – "Kaavu theendiyal, Kulam vattum" –loosely translated as "if the sacred grove is contaminated/ desecrated, the ponds will dry up" exemplifies the connection between the presence of the sacred grove and the local ground water availability which was known to ancient wisdom.

Kerala receives appreciable rainfall (about 3000 mm annually), however droughts are not uncommon during the summer months. This is clearly due to unscientific management of handling water resources. The rampant urbanisation and increased paved areas have lead to an increase in surface runoff thereby preventing effective percolation to recharge the ground water. On the contrary, the soil in sacred groves is known for its high porosity and low bulk density vis-à-vis the soils of the vicinity. (Anupama, 2009) They absorb the water like a wet sponge and allow for smooth percolation into the ground water.

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Most sacred groves have an associated waterbody which was traditionally used as an effective source of water. The sacredness attributed to the grove often helped in ensuring the waterbody too is protected and used responsibly.

### 4.3 Role in soil fertility

The canonical beliefs ensure that leaf litter is not cleared from the floor of the sacred grove. This leads to a humus rich layer on the sacred grove floor which adds numerous nutrients to the soil. The thick litter layer accumulated over years combined with the micro channels created by the soil macro fauna together enhances the water retention and effective gaseous exchange. The soil acts as a nutrient sink and is rich in beneficial microorganisms. The surface run off from the sacred groves to the adjoining low lying paddy fields often help in supplying organic replenishment to the crops. (Ramachandran et.al, 1991)

### **4.4 Microclimatic influences**

Owing to the varying sizes and the fragmented distribution of sacred groves, their role in influencing the climatic regime of a region is debatable; however, studies have been conducted on their role in ameliorating the microclimate of their immediate vicinity. Khiewtam and Ramakrishnan(1989) in their research on sacred groves in the north eastern part of India, have observed that the transpiration from the sacred grove vegetation would increase the atmospheric humidity during the summer months and help in reducing the temperature to produce a more favourable microclimate.

### 5. FACTORS RESPONSIBLE FOR DEGRADATION OF SACRED GROVES

### 5.1 Socio-Cultural Transformations

### 5.1.a Dissolution of the joint family system

Kerala has traditionally always had a joint family system. The land reserves were always clustered and were tended together. However in the recent decades, there has been a steady migration of families to urban areas for search of better employment opportunities. This emergence of the nuclear family based society has lead to the dispersion of the land holdings and lack of interest in maintaining the sacred groves.

### 5.1.b Changing lifestyles and beliefs

In the past, temple and sacred grove used to be an integral part of village life. Often, the community sacred grove would act as a centre of governance. With an acceptance of a globalised lifestyle and socio cultural changes, the sacred groves have lost their relevance to the people.

### 5.1.d Misinterpretation of the canonical rules

The old canonical rules and sanctions which were made to protect the sacred groves are often misinterpreted. The logic behind them is conveniently forgotten and they are often viewed as 'superstitions'.

### 5.2 Socio-economic Reasons

### 5.2.a Economic condition of land owners

Most privately owned sacred groves are often seen as liability by many families. This is especially so if the economic conditions of the families are weak. They often eye the sacred groves as potential real estate reserves, which can be disposed off provided they get a buyer who is not deterred in clearing them.

### 5.2.b Overexploitation of resources

Valuable and rare medicinal plants are often found in sacred groves. With most of the Western Ghat forests being given a high protection status by the Govt. of India and State Governments, the sacred groves have become a soft target for exploitation. Though extraction of plant products for medicinal use was permitted in sacred groves, they were not meant for plundering with vested commercial interests. This large scale extraction does have detrimental effects on the health of sacred groves.

### 5.3 Ecological Reasons

### 5.3.a Habitat fragmentation

Sacred groves in the past were surrounded by garden lands (coconut, areca nut groves, spice gardens etc) or were contiguous with paddy fields, streams etc. This heterogeneous mosaic provided the necessary corridors for movement of biota and cycling of nutrients. The increased pressure of urbanisation, rising land value and land use modification have caused severe fragmentation of the landscape connectivity leaving sacred groves as isolated patches. However, it is pertinent to note that these isolated patches are the only refugia for avifauna in many cases.

### 5.3.b Invasive species

Many sacred groves have been taken over by alien invasive species, destroying their floristic diversity. A recent scientific study discovered that a highly invasive species the yellow crazy ant (Anoplolepis gracilipes) dominated the leaf litter in sacred groves of Kerala (Perinchery, A., 2017).

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### 6. THE WAY FORWARD

The following steps have been identified as being crucial to protect the sacred groves.

### 6.1 Documentation and Data Bank Preparation

The need of the hour is to document all the existing sacred groves in terms of their locations, geographical area, boundaries ownership maps and creating detailed databanks of their biodiversity, soil composition. Proper mapping and boundary demarcation would help prevent sacred groves from being encroached upon. Maintaining updated databases would also help in identifying the bio-gene potential of native and endemic species contained in the groves. This will immensely help in identifying native/ wild strains of crop varieties which can significantly improve the health of the cultivated varieties since they respond better to local climate, soil conditions and pest resistance.

### 6.2 Awareness Generation and Community Participation

Generating awareness amongst not just the stake holders but also the community in general regarding the eco-cultural significance of sacred groves is important. The canonical taboos which protected the sacred groves from intrusive human interventions are often been questioned or neglected. Hence it is imperative to bring out the scientific premise of the logic behind the taboos to ensure protection is apprehended to sacred groves. Sacred groves have been traditionally protected by either households or communities. They can be effective models for decentralised community based natural resource conservation. (Pruthi and Burch, 2009)

### 6.3 Financial and Other Incentives

Providing financial incentives to maintain sacred groves could be a possible way of saving them from destruction. The Govt. of Kerala has recently come up with a scheme to encourage sacred groves to be documented and funding provided to help maintain them. In addition to such financial incentives efforts must be made to instil a sense of pride amongst stake holders. State recognition in the form of awards and grants could be accorded.

### 6.5 Restoration of Degraded Sacred Groves

The degraded sacred groves which may have been subjected to unscientific clearing in the name of 'development' can be brought under a scheme wherein responsible scientific institutions are roped in to research on the original floristic composition and provide guidance on regeneration of sacred groves. Invasive species could be identified and weeded out. Nurseries could also be set up for propagating rare and endemic plants based.

### 6.6 Preparation of a Policy Framework for Integrated Eco-cultural Approach

Sacred groves cannot be studied in isolation since they are units belonging to a larger eco-cultural mosaic. The natural processes, energy and nutrient cycles, movement of biota, be it seed dispersals or physical movement of birds and animals which shape the ecological regime of the grove will have to be studied in conjunction with the surrounding landscape since these processes are not bound by the demarcated boundaries of the groves.

The unique and distinct art forms and folk traditions associated with the sacred groves are fast disappearing. They are important cultural fibres that weave the sacred traditions with ecological processes creating a tapestry of eco-cultural identity that is rooted in the primordial beginnings of the society. They need to be documented, understood and recognised to prevent an erosion of cultural identity.

Sacred groves are an integral part of Kerala's eco-cultural landscape. They are classic examples of nature conservation, not by building 'walls' but by the sheer cultural conviction of generations. The canonical beliefs and sanctions which protected these relic patches of biodiversity for centuries are now losing their effectiveness and hence the need for formulating an integrated policy framework that addresses both the socio-cultural and ecological aspects pertaining to the sacred groves, which can be successfully implemented to ensure their sustenance for posterity.

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# Senzai Bori and the Japanese Stroll Garden Transition to a New Australian Garden Style

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### ABSTRACT

Managed Ecosystems are applied to formed gardens using a historical gardening technique 'Senzai bori' to disseminate accepted plant lists as a method for replacing plants from a traditional Japanese Stroll garden or to a new Australian style garden.

Shiro Nakane noted that Western visitors to Japanese gardens often comment that except for an occasional azalea or camellia, there are few flowering plants. The Japanese have possessed a tradition to live symbiotically with nature, and their gardens and surrounding nature included exactly the same vegetation inherent in the landscape. Such a manner of living symbiotically with nature, experiencing of four seasons, and integrating them as part of daily life echoed in events such as haruno-asobi (spring picnic), senzai bori (transplanting of wild plants), mushi-kari (catching chirping insects), and momiji-gari (excursion for viewing autumn leaves). The use of senzai bori provided an opportunity to utilise Australian plants in a Japanese style garden, using this historical precedence to record an authentic representation within Australia.

In 2012, Seiko Goto, stated that 'factors related to experience or interest may affect preference for garden style'(Visual Preference for Garden Design: Appreciation of the Japanese Garden').

Goto (Goto, 2012) compared herb and Japanese gardens as different types of garden design, with Japanese gardens commonly designed for observation. Mimicry in design as a form of representation of a 'beloved landscape' using elements in nature to represent parts of a natural vista thereby fitting a broad landscape into the confines of a small garden (Seiko, Kamal, Puzio, Fujii, & Herrup, 2013)

The investigation into the Japanese Garden sensibility follows the historical linking produced by applying 'senzai bori' from Japanese to Australian plants, which follows a cultural development from the Chinese design origins expanded to an ecology to culture continuum confronting the Anthropocene epoch.

Keywords: Landscape Quality; Senzai Bori; Australian Plants; Phylogenetic; Anthropocene.

### 1. INTRODUCTION

'Putting plants first' (Ogden & Ogden, 2008) notes a different approach to designing gardens that referents plant selection as the key. Using this strategy for reviewing Japanese gardens from a plant driven basis allows for demarcating and objectively review the garden in terms of selection before placement. 'When plant material dies, it can be replaced faithfully or redone in a new fashion.' (Kuitert, 2002a, p. 92) How, what, when and why are crucial questions to address plants within the plantscape, which represents not just an environment, but political, social, cultural, economic, scientific including evolutionary phylogenetic narratives and historical space. The term 'native plants' can be interpreted in many ways. Native plant advocacy can represent a system of 'botanical decolonization and a strategic location for ethical action in the Anthropocene.' (Mastnak, Elyachar, & Boellstorff, 2014).

"The individual being is seen, for all practical purposes, as the originator of preference and, therefore, of value" (Brown 1984, p. 231). It is also because of the role citizen preferences play in the instigation of endangered species legislation, the growth of environmental activism, and publically driven environmentally oriented behavior that instigated proactive consumer driven recycling, water conservation campaigns, wilderness recreation places, green consumerism and cycleways.

There is ICOMOS historical practice noted in monuments; timber structures and in the restoration and conservation guidelines. Japanese gardens likewise has not just historical significance, which culminated in the 'Kyoto Declaration 2005 on Protection of Cultural Properties, Historic Areas and their Settings from Loss in Disasters' to protect the city from tsunamis and earthquakes. Disaster mitigation due to geological climatic phenomena, perpetuated and exacerbated by human activity. Plant biodiversity to ensure practices of Senzai bori is represented not just as a historical technique, but a solution to environmental horticultural practices including grafting/hybridization and tissue culture.

### 2. PLANT SELECTIONS

Australian plant selections were based on;

- Translation 1.
- 2. Plant Family - Specific replacements - like for like
- 3. Visual Appearance
  - 3.1. Leaf shape / texture / colour / Size

### 2.1 Translation

The Japanese Garden emulated a microcosm of Japan. The embodiment of the Japanese garden style embodied the entirety of Japan, from beach to the mountains. Transplanting of wild plants; the practice of Senzai bori, reflects a commonsense reaction to plant senescence; by scanning the local landscape for plant material that may be more suitable. The sensory openness to flora as vital to the formation of a 'sense of place' can be fully appreciated in experiencing Japanese gardens not just in one region, but throughout Japan, which explains how 'traditional standard plant lists can be easily dismissed as each garden incorporates at least one species not seen in a garden less than 5km away. How Plato distinguishes between illusion and reality with that eternal and unchanging forms or ideas that posit reality and experiences via sensations are copies that mimic the forms.

This contrasts to verifying reality via a multi-sensorial environment; such experiences are themselves in their nature non-representational relations to ordinary objects confirming from experiencing visual aesthetics to engagement with flora generating the sense of place through the appreciation of plant material translated into a multitude of body sensations. Man and nature are transformed, portrayed in harmony, even when viewing rock placements at Ryoanji. The philosophical message regarding one's relationship to nature. The Karensansui rock grouping is deliberately placed such that no matter where one sits to contemplate the entire scene, one of the rocks is obscured. The Zen monks suggest memory is linked to imagination which is necessary to participate in perceptions.

### 2.2 Plant family

The guantified botanical landscape via a hierarchy embedded within 'The Plant List'. A drill down through the taxonomic hierarchy from the Major Group (to find out which Families belong to each), to the 620 members of the Family (to work out which Genera belong to each) or Genus (to find out which Species belong to each).

Using plant species such as Podacarpus elatus instead of Podocarpus macrophyllus or nagi (Podocarpaceae) and instead of Wisteria sinensis using Callerya megasperma (Fabaceae) are easy to interchange as they belong to the same family.

### 2.3 Visual Appearance

### 2.3.1. Leaf shape / texture / colour

Leaf shape, texture and colour are important characteristics that determine simple visual selections, such as with the linear Podacarpus leaf shape, with acuminate leaf tips, texture and colour is very similar for these trees and small shrubs. Shape representation and matching from observation and comparisons are limited to the shape, and compared to other parts of a plant, such as flower, fruit, stem and bark, leaf is often used for plant identification since its features are more universal and persistent.

Wisteria sinensis (Chinese Wisteria) and Wisteria floribunda (Japanese Wisteria) which are used in most of the Japanese and Japanese Style Gardens are noted weeds within Australia and have very similar features can best be identified once in flower, which is slightly larger and darker in colour than the floribunda. Callerya megasperma flowers in Australia between July and October, along with the other wisterias, but its racemes are on 25cm in length. The main difference between these wisterias is that the Callerya is noted as a food source for butterflies including the caterpillars of the Richmond Birdwing Butterfly.

### **3. ECOLOGICAL FEATURES**

- plant ethology 1. plant ecology
- Hardiness zone/ Climatic zone 0
- Plant particulars 0
- Deciduous or evergreen 0
- 0 Position
- Habitat Ο

Plant Ethology, and a regional landscape diaspora can sustainably improve the garden and the immediate surroundings including the landscape aesthetic and improved landscape function including interdependence with local fungi and fauna. Selecting appropriate plants minimise impacts of drought, escapees (weeds) and the long-term effects of climate change on gardens and maintenance costs. creating a sense of place.

Species such as Nandina domestica, family Berberidaceae have no representation in Australia. Nandina 'Japanese sacred bamboo' is naturalised and are environmental weeds (in NSW) as is Acer negundo, Lantana camara hybrids, Lonicera japonica and Cotoneaster species.

Invasive species are one of the greatest threats to biodiversity in Australia. In NSW, pest animals and weeds (Global Climate Model (GCM) projections) are identified as a threat to 70 per cent of the species populations or ecological communities listed. (http://www.environment.nsw.gov.au/ pestsweeds/). Plant invaders, environmental weed, garden escapees including Cyprinus carpio (Japanese Carp) (GISD, Global Invasive Species Database, http://www.issg.org/database). Cytisus racemosus 'Nana' (Dwarf Genista) has no weed status to date, and other plants which include Azaleas, Camellias, Photinias and Hebes, pose no threat as garden escapees.

### 4. PLANT DISTRIBUTION

Plant Ethology, and a regional landscape diaspora can sustainably improve the garden and the immediate surroundings including the landscape aesthetic and improved landscape function including interdependence with local fungi and fauna. Selecting appropriate plants minimise impacts of drought, escapees (weeds) and the long-term effects of climate change on gardens and maintenance costs, creating a sense of place, and the potential green corridor for fauna.

### 4.1 Plant Ecology

The implications of exploring branches in phylogenetic trees and the biological information inherent are ongoing. Highlighting the role of taxon and the biological significance of phylogenetic distinctiveness and diversity including microorganisms often ignored in conservation planning. Applying Japanese Garden design to Australia or any place outside Japan should then consider applying the logic of locality, and thereby introducing a selection of native and provenance plants which are resilient, self-sustaining revegetation (with morphological and physiological adaptations of Monocots, Dicots, Pteridophytes, Nymphaeales and Bryophyta) to the environment that is familiar.

### 4.1.1 Conservation

Using NSW, where native vegetation clearing had been prohibited, permitted, or alternatively had been actively promoted. Spatial and temporal impacts result in broader understanding of historic land-use and gardens can enhance our understanding of the effects of post-European settlement on our varying ecosystems which will inform future restoration and conservation management activities.

### 5. FIGURES

From the opening of Japan from 1860, derivative Japanese gardens were gardens that were 'first impressions' that appeared in England based on observations made by the first visitors to Japan. Figure 1. Outlines the movement from Japanese gardens from Japan to the various hybrid Japanese Style Gardens produced outside of Japan. There is a process lag of plants between authentic Japanese Gardens to applied Japanese style Gardens, and in some of the

Jill Didur first noted 'transculturation' (DeLoughrey, Didur, & Carrigan, 2015) as the commodification of objects which had commenced since the first nurserymen appeared in Japan. Standard plant selection was identified when literature of Japanese Gardens was disseminated to Australia and other parts of the Western World. (Keane, 2009; Kuitert, 2002b; Sadler, 1963; Slawson, 1985; Takei & Keane, 2001) In Australia a major expansion of Camelia cultivars from 1950 occurred with hybridisation between C.saluenensis, C.japonica, C reticulata, and C.sasanqua, which started with arrival of Camellia japonica 'Aspasia Macarthur' in 1831. The development continued into the 19th century by the major Sydney nursery; Shepherd & Co which listed 160 varieties. Tailored plant range developed from Ken Nakajima's garden at Cowra, NSW in 1975 with inclusions of several local and common Australian plants. The development of the new revised plant selection commenced with the first small Japanese gardens produced at Murrays Beach in NSW from 2015 (Fig. 2) using only Australian plants. Figure 1 outlines the process of how the 'New revised plant selection' or Australian Flora based Japanese Garden has developed from iterations from Japanese gardens to Japanese Style Gardens, whilst remaining distinct from both, existing as a continuum from Japanese gardens, whilst recognizing Japanese Style Gardens as a style in which to interact with, Australian Flora based Japanese Gardens will flow directly from Japanese Gardens due to the heritage thresholds and values formulated from Japanese Gardens research, and refer to Japanese Style Gardens as 'derivative.'



Fig. 1. Japanese Gardens Plant process from 1800 to 2017.



Fig. 2. Murrays Beach – Initial 'New Revised Plant Selection' Garden 2015

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## 6. TABLES

## Australian Plant Selection use for Cowra Japanese Garden (1976)(Blacha, 2016)

Botanical Name	Common Name	Family	Туре
Acacia howittii	'Honey Bun'	Mimosoideae	low shrub
Acmena smithii minor	'Small leaf Lilly Pilly'	Myrtaceae	tree
Agonis flexuosa	'Flamingo'	Myrtaceae	tree
Alloxylon flammeum	'Tree Waratah'	Proteaceae	tree
Alpinia caerulea	'Native Ginger'	Zingiberaceae	shrub
Angophora hispida	'Dwarf Apple Box'	Myrtaceae	small tree
Anigozanthos *varieties	'Kangaroo Paws'	Haemodoraceae	large strappy plant
Asplenium nidus	'Birds Nest Fern'	Aspleniaceae	fern
Atractocarpus fitzalanii	'Native Gardenia'	Rubiaceae	tree
Baeckea virgata	'Twiggy Heath Myrtle'	Myrtaceae	low shrub
Banksia aemula	'Wallum banksia'	Proteaceae	medium shrub
Banksia ericifolia	'Red Rover'	Proteaceae	medium shrub
Banksia integrifolia	'Roller Coaster'	Proteaceae	prostrate shrub
Banksia serrata	'Old Man Banksia'	Proteaceae	tall shrub
Banksia spinulosa	'Song Bird'	Proteaceae	medium shrub
Banksia spinulosa	'Hairpin Banksia'	Proteaceae	medium shrub
Brachychiton acerifolius	'Flame Tree'	Malvaceae	tall tree
Buckinghamia celcissima	'Ivory Curl'	Proteaceae	small tree
Callerya megasperma	'Native Wisteria'	Fabaceae	vine
Callistemon citrinus	'White Anzac'	Myrtaceae	small shrub
Callistemon pearsonii	'Rocky Rambler'	Myrtaceae	prostrate shrub
Callistemon salignus	'Great Balls of Fire'	Myrtaceae	medium shrub
Callistemon viminalis	'Little John'	Myrtaceae	small shrub
Callistemon viminalis	'Wildfire'	Myrtaceae	medium shrub
Callitris rhomboidea	'Oyster Bay Pine'	Cupressaceae	medium tree
Capparis arborea	'Native pomegranate'	Capparaceae	small tree
Casuarina glauca	'Cousin it'	Casuarinaceae	low shrub
Casuarina glauca	'Green Wave'	Casuarinaceae	medium shrub
Casuarina littoralis	'Black She-oak'	Casuarinaceae	medium tree
Ceratopetalum	Success and and and a	des some some	1
gummiferum	'Christmas Bush'	Cunoniaceae	medium tree
Correa alba	'White Correa'	Rutaceae	small shrub
Correa federation bell x	1000000000000000	0.0388-0359-0	
mannii	'Canberra Bells'	Rutaceae	small shrub
Correa pulchella	'Little Cate'	Rutaceae	small shrub
Corymbia ficifolia	'Flowering gum'	Myrtaceae	small tree
Crinum pedunculatum	'Swamp lily'	Amaryllidoideae	large strappy plant
Dianella caerulea	'Blue flax lily'	Hemerocallidaceae	strappy plant
Dianella caerulea Dwarf	'Tiny Titan'	Hemerocallidaceae	small strappy plant
Dianella revoluta	'Black Anther Flax Lily'	Hemerocallidaceae	strappy plant
Dietes robinsoniana	'Lord Howe Wedding Lily'	Iridaceae	medium lily
Diospyros australis	'Black Plum'	Ebenaceae	medium tree
Doryanthes excelsa	'Gymea/Giant Lily'	Doryanthaceae	large strappy plant
Elaeocarpus reticulatus	'Blueberry Ash'	Elaeocarpaceae	medium tree

Eremophila maculata	'Emu Bush'
Eucalyptus - grafted	'Summer Red'
Eupomatia laurina	'Bolwarra'
Eutaxia obovata nana	
Exocarpos cupressiformis	'Native cherry'
Ficinia nodosa	'Knotted club-rush'
Grevillea 'Honey Gem'	
x formosa	'Cooroora Cascade'
Grevillea juniperina	'Molongio'
Grevillea lanigera	'Mt Tamboritha'
Grevillea victoriae x	1000 100 1000
rhyolitica	'Lady O'
Hakea laurina	'Pin-cushion Hakea'
Hakea verrucosus	
Helmholtzia glaberrima	'Stream Lily'
Homoranthus flavescens	
Homoranthus lunatus	
Homoranthus papillatus	
Homoranthus prolixus	
Isopogon anemonifolius	'Drumsticks'
Jasminum suavissimum	'Native Jasmine'
Juncus sp	'Common Rush'
Lagerstroemia archeriana	'Native Crepe Myrtle'
Leptospermum petersonii	'Lemon-Scented Tea Tree'
Livistona australis	'Cabbage-Tree Palm'
Lobelia anceps	'Blue Skies'
Lomandra confertifolia	'Little Con'
Lomandra confertifolia	'Echidna Grass'
Lomandra confertifolia ssp.	
Rubiginosa	'Mist'
Lomandra longifolia x	1
contentitolia subp. Pallida	Lime Iuff
Lomatia silaitolia	Crinkle Bush
Lophozonia cunninghami	Myrtle Beech
Macrozamia communis	Burrawang
Melaleuca linariitolia	Snow Storm
Melaleuca linariitolia Dwart	Little Red
Mella azedarach	White cedar
Microcachrys tetragona	Creeping Pine'
Myoporum floribundum	Weeping myoporum
Notelaea longifolia	Large Mock-olive
Omalanthus nutans	'Bleeding Heart'
Ozothamnus	'Colour Surprise'
Ozothamnus	'Marmalade'
Ozothamnus	'Red Gingham'
Pandorea jasminoides	Bower of Beauty - Vine
Podacarpus elatus	Plum Pine'
Prumnopitys ladei	Mt Spurgeon Black Pine
Pultenaea villosa	Hairy Bush Pea
Rulingia hermanniifolia	
Schizostachyum sp	
Murray Island	Murray Island Bamboo
Stenocarpus angustifolius	Doreen'

	Scrophulariaceae	small shrub
	Myrtaceae	small tree
	Eupomatiaceae	medium tree
-	Fabaceae	small shrub
	Santalaceae	medium tree
	Cyperaceae	rush
_	11	
	Proteaceae	medium shrub
-	Proteaceae	prostrate shrub
_	Proteaceae	prostrate shrub
	Proteaceae	medium shrub
	Proteaceae	small tree
	Proteaceae	small tree
	Philydraceae	large strappy plant
- 1	Myrtaceae	medium shrub
	Proteaceae	medium shrub
-	Oleaceae	vine
	Juncaceae	rush
-	Lythraceae	medium tree
'ee'	Myrtaceae	large shrub
	Arecaceae	paim
-	Campanulaceae	groundcover
	Lomandroideae	low stranov plant
-	Lomandroideae	low strappy plant
-	Lonianaronaoao	fow accepty picini
	Lomandroideae	low stranov plant
_		madium stranny
	Lomandroideae	nlant
_	Proteaceae	low shrub
_	Nothofagaceae	tall tree
_	Zamiaceae	ovcad
	Murtaceae	small shruh
_	Myrtaceae	emall ehn ih
_	Meliaceae	modum ehn h
_	Dodocamacaaa	madum shub
-	Semohi dariaceae	aroundcours
-	Oleaceac	groundover medium tree
-	Euphorbiosson	modum trop
-	Astoronono	medium ree
-	Asteraceae	small shrub
-	Asteraceae	small shrub
-	Asteraceae	small shrub
_	Bignoniaceae	virie medium trac
	Podocarpaceae	medium tree
8	Podocarpaceae	medium tree
_	Fabaceae	small shrub
_	Malvaceae	prostrate shrub
	-	
_	Poaceae	clumping bamboo
	Proteaceae	medium shrub

Syzigium wilsonnii x	'Cascade'	Myrtaceae	medium shrub
Syzygium australe	'Winter Lights'	Myrtaceae	medium shrub
Telopea speciossima	'Waratah'	Proteaceae	medium shrub
Westringia	'Funky Chunky'	Lamiaceae	medium shrub
Westringia	'Jervis Gem'	Lamiaceae	medium shrub
Westringia	'Coastal Creeper'	Lamiaceae	prostrate shrub
Westringia longifolia	'Smokie'	Lamiaceae	medium shrub
Xanthorhoea glauca	'Grasstree'	Asphodelaceae	medium strappy plant
Xanthosterrion chrysanthus	'Fairhill Gold'	Myrtaceae	medium tree
Xanthosternon chrysanthus	'Little Penda'	Myrtaceae	low shrub
Xerochrysum bracteatum	'Paper Daisy'	Asteraceae	perennial
Zieria prostrata	'Carpet Stars'	Rutaceae	prostrate shrub

### 7. GARDEN SCALE AND ECOTOURISM

The stroll garden format will be maintained for authenticity purposes prior to alterations due to natural environmental factors such as aspect and topography and scale of the site. Reconciliation of the true and valuable portions in the relating of the East and the West from a new perspective.

Tourism potential can be promoted through the banner of Ecotourism, which will involve travel to destinations where flora, fauna, and cultural heritage are the primary focal attractions.

### 8. ETHICS

Environmental ethics, in the practice of dichotomy of 'right' versus 'wrong' conduct toward nature (Armstrong and Botzler 1993; Proctor 1996; Rolston 1999). Environmental ethicists axiomatic work on the subject have considered a philosophical basis for assigning value from arguing for intrinsic moral values embodied in nature and its component parts. Based on our consciousness; humans are thus moral agents due to our ability to evaluate things such as species, ecosystems, organisms, and can nonetheless be defended as possessing certain kinds of value in and of themselves (Callicott 1984; Nash 1989; Norton 1991; Rolston 1988; Sagoff 1988; Stone 1987).

### 9. CONCLUSIONS

Australian Flora based Japanese Gardens will provide not just an ecological advantage, but with further investigations into the configuration of the garden and comparisons of plants within specific sites to existing Japanese Style Gardens with Japanese Gardens, it can then be determined if participant samples prefer 'traditional' plant use to the Australian alternatives through a combination of individual/ expert and impromptu interviews and surveys.

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# Community participation and native plant use in the creation of a tea ceremony garden

### ABSTRACT

Izanagi Shrine, which stands on Awaji Island where I work, is a revered Shinto shrine. A house for tea ceremony was designed by Yumyousai who was the head master of the Urasenke tea ceremony school. This tea house was donated to the shrine.

The site is about 600 m2 and is surrounded by shady trees and a pond. I was asked to make a tea ceremony garden there and started in 2012. In this tea ceremony garden, however, community members participated and we tried to use native plants. The reasons were to enhance the identity of the garden in the shrine and to make attachment to the shrine stronger through participation. We placed rocks, including natural and long cut stones already on site and precious garden rocks donated from abandoned houses on Awaji Island. These rocks were used as scenery, stepping stones, stones around a basin for hand-washing and other special roles.

We also surveyed the shrine forest and made a list of plants for use. Referring to this list, we replanted low and medium trees and grass from the shrine forest. We also replanted precious grass from a traditionally-managed satoyama forest nearby. The moss, low trees and grass we planted are native to the surrounding community. Through this work with the participation of community members, we created a tea ceremony garden reflective of the scenery of Awaji Island and cultivated a sense of attachment and the motivation for continued maintenance.

Keywords: Tea ceremony garden, native plants, community people

### **1. INTRODUCTION**

Izanagi Shrine, which stands on Awaji Island where I work, is a revered Shinto shrine. Myth places the god that created the islands of Japan there. A house for tea ceremony was designed by Yumyousai who was the head master of the Urasenke tea ceremony school and lived in Awaji after his retirement. This tea house was donated to the shrine.

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The site is about 600 m2 and is surrounded by shady trees and a pond. I was asked to make a tea ceremony garden there and started autumn in 2012. I would like to explain the process now that it is almost complete (Fig. 1, Fig. 2). The reason that it took four years is because we aimed to construct it by ourselves and to use regional plants and stones as much as possible. Usually when we make a garden, we buy trees commercially and professional gardeners work on it. In this tea garden, however, community members participated and we tried to use native plants from around the community. The reasons were to enhance the identity of the garden in the shrine and to make attachment to the shrine stronger through participation.



Fig. 1 The place visible from the road (Nov. 2014)



Fig. 2 Around the tea ceremony house (Nov. 2014)

We surveyed the conditions around the tea room, including the shrubs around the pond, tall and medium-height trees, sunlight, topography, and wind.

- 2.1.1 Survey on the current conditions of the of tea house surroundings
- 2.1.2 Measuring

2. METHOD

2.1 Survey

- We measured the tea house surroundings. 2.1.3 Vegetation survey of shrine forest
- We conducted a vegetation survey of the large forest behind the main shrine. 2.1.4 Survey for rocks
  - We surveyed abandoned houses in Awaji Island and the precinct for rocks.

### 2.2 Arrangements

- 2.2.1 Calls for local residents and volunteers We invited local residents and volunteers to various events to promote participation.
- 2.2.2 Coordination with gardening contractors We made arrangements with gardening professionals for the removal of trees, the installation of rocks and the planting of medium and tall trees.

### **3.RESULTS**

We first show the results of the survey below.

- 3.1 Survey results
- 3.1.1 Dense shrubs grew around the pond The surroundings of the tea house were dark and not suitable for planting. We had to cut shrubs and bamboo grass.
- 3.1.2 Medium and tall trees
- 3.1.3 Sunlight The shrubs and the trees were too overgrown, so the sunlight was not good.
- 3.1.4 Topography The terrain was sloping towards the pond, so drainage was good but too dry. 3.1.5 Wind

The wind conditions were not good because of the shrubs around the pond and the densely-growing trees.

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There were some weak medium and tall trees that had to be removed.

### 3.2 Planning and design

Based on this situation, we made some plans. We had the plan of the tea ceremony house. We also tried the site measurement. Usually, a tea garden is divided into an outer garden and an inner garden. The outer garden is the first garden where we enter from the road or another garden and it is a little more open. In one plan, we shortened the length of the outer garden path, and in the second plan we made this path longer. The priest asked us for a longer path for the outer garden (Fig. 3).

There are several constructed elements in the tea garden, including a gate and stepping stones. For the stepping stones, I used long stones and designed them to have a rhythm. We also constructed a waiting area in the outer garden where the main guest and other guests sit in a decided order.

We used many rocks in the outer garden, but we set them all low and kept their appearances subdued. We also placed a rock that symbolizes a turtle, which is an animal familiar to this shrine. There is also a traditional toilet area, which is called a "sunasecchin" and is only for appearances. We set up long narrow stones for the path and some scenic stones in front of the pond. We also set up a wooden door for the entrance to the inner garden from the outer garden and a bamboo fence called a "yotsumegaki" on the border between the two.



### 伊弉諾神宮 茶庭計画図 兵庫県立大学緑環境景観研究科 2013.4.30 Fig. 3 First plan for the tea garden

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We set up a large stone called a "gakumiishi" (name viewing stone) that shows the name of this tea house, which is "Myonichian" (tomorrow hermitage). In addition, we carved a water basin in a Kurama stone that we recovered from an abandoned garden on Awaji Island to make a "tsukubai" for hand-washing. Before this stone, there are also stones named for placing a light and a hot water pot and for sitting in front of it. We also set a black metamorphic rock in the inner garden as a small scenic focus.

### 3.3 Construction with the participation of local residents and vegetation survey

We spent 4 years, which is relatively long time, on construction. Reasons this much time was needed included starting with a survey of the surrounding area, investigating resources in the area, and gradual work progress due to reliance on recruiting volunteers among both local residents and people from off the island.

We first made a list of plants to be used in this tea garden and did a survey of the shrine forest. Tea gardens mainly use evergreen trees and other subdued plants to produce a world of silence and "wabisabi."

In addition, the shrine forest has been conserved for many years, so the vegetation survey was very helpful for learning about the vegetation of the area (Table 1).

The site faces a pond, has a slight slope and good drainage, but was gloomy with the dense growth of medium and tall trees and waterside shrubs. We removed the trees that were already almost dead or overgrowing the roof of the tea house. Community members removed shrubs and weeds.

In addition, we recruited local residents and volunteers outside the island to cut down the bushes, transplant small shrubs and herbs from the shrine forest, and transplant groundcover. More than ten people participated every time based on continuous cooperation with the Shinto shrine.

In the meantime, construction of the waiting area and the gate was donated by the Takashima family of Awaji island. This family also donated the tea ceremony room. Where to construct the waiting area and the gate was decided in consultation with the Shinto shrine priest.

### Table 1. List of the flora in the shrine forest (Sawada, Hayashi, et al.)

Microlepia marginata (Panzer ex Houtt.) C.Chr.	Oxalis debilis Kunth subsp. corymbosa (DC.) Lourteig
Pteris multifida Poit.	Neoachmandra japonica (Thunh.) W.J.de Wilde et Duyfjes
Deparia japonica (Thunb.) M.Kato	Daphniphyllum teijsmannii Zoll. ex. Kurz
Dryopteris erythrosora (D.C.Eaton) Kuntze	Citrus junos (Makino) Stebold ex Tanaka (?)
Thelypteris acuminata (Houtt.) C.V.Morton	Toxicodendron succedaneum (L.) Kuntze
Thelypteris angustifrons (Miq.) Ching	Andisia crenata Sims
Thelypteris viridifrons Tagawa	Andisia japonica (Thunh.) Blume
Cyrtomium falcatum (L.f.) C.Presl	Ilex rotunda Thunb.
Podocarpus macrophyllus (Thunb.) Sweet	Enonymus japonicus Thunb.
Morella rubra Lour.	Euonymus sieboldianus Blume
Castanopsis sieboldii (Makino) Hatus ex T. Yamaz et Mashiba	Cayratia japonica (Thunh.) Gagnep.
Quercus glauca Thunh.	Parthenocissus tricuspidata (Stebold et Zucc.) Planch.
Aphananthe aspera (Thunh.) Planch.	Elaeocarpus zollingeri K.Koch
Celtis sinensis Pers.	Elaeagnus pungens Thunb.
Fatosa villosa (Thunb.) Nakai	Xylasma congesta (Lour.) Merr.
Ficus erecta Thunh. var. erecta	Aspidistra elatior Blume
Ficus nipponica Franch, et Sev.	Liriope muscari (Deene.) L.H.Bailey
Fallopia japonica (Houtt.) Ronse Decr. var. japonica	Ophiopogon japonicus (Thunh.) Ker Gawl. var. umbrosus Maxim.
Pensicaria filiformis (Thunh.) Nakai ex W.T.Lee	Aralia elata (Miq.) Seem.
Achyranthes bidentata Blume var. japonica Miq.	Dendropanax trificius (Thunh.) Makino ex H.Hara
Kadnira japonica (L.) Dunal	Fatsia japonica (Thunh.) Decne. et Planch.
Cinnamomum camphora (L.) J.Presl	Hedera rhombea (Miq.) Bean
Cinnamomum tenuijolium (Makino) Sugim. ex H.Hara	Cryptotaenia canadensis (I. ) DC. subsp. japonica (Hassk.) Hand-Mazz.
Litsea coreana H.Lev.	Osmorhiza aristata (Thunb.) Rydb.
Neolitsea sericea (Blume) Koidz.	Trachelospermum asiaticum (Stebold et Zucc.) Nakai
Nandina domestica Thunh	Solanum lyratum Thunb.
Akebia quinata (Houtt.) Decne.	Callicarpa japonica Thunb.
Akebia trifoliata (Thunb.) Koidz	Clerodendrum trichotomum Thunb.
Stauntonia hexaphylla (Thunh) Decne.	Commedina communis L.
Houtteynia condata Thunb.	Pollia japonica Thunb.
Camellia japonica L.	Plantago asiatica L.
Camellia sinensis (L.) Kuntze	Ligustrum japonicum Thunb.
Cleyera japonica Thunb.	Phyllostachys edulis (Carriere) Houz.
Eurya japonica Thunb. var. japonica	Oplismenus undulatifolius (Ard.) Roem. et Schult.
Ternstroemia gymnanthera (Wight et Am.) Bedd.	Trachycarpus fortunei (Hook.) H.Wendl.
Pittosporum tobira (Thunb.) W.T.Aiton	Zingiber mioga (Thunh.) Roscoe
Eriobotrya japonica (Thunb.) Lindl.	Paederia scandens (Lour.) Merr.
Photinia glabra (Thunb.) Maxim.	Sambucus racemosa L. subsp. sieboldiana (Miq.) H.Hara
Potentilla anemonifolia Lchm.	Farfugium japonicum (L.) Kitam.
Kummerowia striata (Thunb.) Schindl.	Youngia japonica (L.) DC.
Misteria floribunda (Willd.) DC.	

Next, we installed rocks together with a construction company. Movement of these large rocks required machines used by professionals. We placed stones that have their own roles around the tsukubai, which is used to wash the hands and mouth, the scenic stone in the inner garden, and the scenic stone and stepping stones on the way to the sunasecchin, which is the faux toilet. In the outer garden, the stepping stone path is long so it took time to set all the stones. In addition, with the construction company, we also set up bamboo fences and planted tall trees and some other plants.

Together with local residents, we repeatedly planted shrubs, herbs and groundcover (especially moss) from the shrine forest and shrine site. In addition, we transplanted grass, moss and other plants from nearby Shirasu Mountain, which has precious rare plants. Next, we placed rocks, including natural and long cut stones already on site and precious garden rocks donated from abandoned houses on Awaji Island. These rocks were used as scenery, stepping stones, stones around the basin for hand-washing and other special roles.

The following figures show the process of the garden construction with captions (Figs. 4 to7).



Fig. 4 Setting stepping stones and planting medium trees (Dec. 2015)



Fig. 5 Planting medium trees and building bamboo fence (May 2016)



Fig 6. Setting moss in the inner and outer gardens for the first time (June 2016)



Fig. 7. Transplanting low trees and grass in the tea garden (Dec. 2016)

### 4. DISCUSSION

A feature of this project was that, in addition to experts and construction companies, we involved local residents in the work as much as possible. They were parishioners of the shrine, neighborhood residents, volunteers from Kobe and others. They performed a variety of tasks including cleaning, cutting grass, transplanting moss, grass and small-to-medium trees from the shrine precincts, and transplanting valuable plants from mountain forests on Awaji Island.By actively participating in the creation of the gardens, the local residents have been encouraged to be involved in them with feelings such as "the tea ceremony gardens are our own gardens," "we want to engage in management in the future," and "we will always be committed." They developed a strong sense of affinity.

Around the tea ceremony room, we installed gravel called "inubashiri" that prevents the rebound of rain drops. We also laid Awaji roof tiles there. These tiles are characterized by a low firing temperature and crack easily, but have a gray color and texture that appears smoky.

The scenic rocks were mainly donated by the Takashima family, but the stones used as stepping stones are mostly from the shrine precincts. Also, rare and valuable garden stones called "real Kurama stones" were dug out from the garden of an abandoned house on Awaji Island. For the stone that is used for washing hands and mouths, I asked a stone professional to drill a hole to make a water basin.

In tea ceremony gardens, setting large or tall stones is not recommended, so we set small stones and laid them down. However, when there are many small stones, it tends to be monotonous, so we tried a stone work reminiscent of the shape of a turtle, which is an animal very loved at this shrine.

As a result, valuable large rocks called "aoishi" (blue stone) were left over, so we set up a space on the outer circumference of the tea ceremony garden in front of the gate and outside of the hedge, and we arranged gravel around those rocks.

Through this work with the participation of community members, we created a tea ceremony garden reflective of the scenery of Awaji Island and cultivated a sense of attachment and the motivation for continued maintenance. This project also helps community members recognize plants in their neighborhood. I believe that the continued promotion of projects like this in communities is desirable.



Fig 8 Tsukubai for washing hands and mouths



Fig. 9 Stepping stones around the waiting area

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The figures below are of the completed tea ceremony gardens at this point. It is not perfect and construction and maintenance are still ongoing. We are continuing to make and maintain this garden (Figs. 8-10).

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Fig. 10 Tea ceremony house and the surrounding area

# Plant species in archaic mural painting for cultural landscape design

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### ABSTRACT

Nowadays plants selection in landscape design is influenced by commercial marketing without concerning of ecology, maintenance, and place identity. Using native plants from natural landscaping is a choice to encourage designers to choose suitable plant materials. The archaic mural painting is a good evidence to understand history of plants in the geographic area.

One of the most famous mural paintings in Thailand was located at Wat Phumin, Nan province. Although there are many researches in Wat Phumin, there is no research of plant species in mural painting. This research takes this opportunity to collect database and analyze paintings for identify plant species to understand which plants were used in history of Nan province or what species were important in Nan culture.

The mural painting at Wat Phumin was examined by photographed and made a database for analysis. The collected paintings were classified by dig into biography of Lord Buddha, Buddha allegories, and Thai Lue scripts which shown as a story in a mural painting. Moreover some realistic painting of plants could be presupposed by compared with literatures, real plant photographs, and interviewing a botanist.

There are 259 paintings of plant that can classify in 75 groups. There are 20 hypothetical species were found with 7 alien species included. A result showed plant species which were found and represented in various places at that time. They can be introduced to a plants selection guideline for cultural landscape design of Nan province especially in Wat Phumin and other archaeological sites.

Keywords: Mural painting; Wat Phumin; Plant species; Identify; Culture

### 1. INTRODUCTION

Art and culture of Nan province has a unique character which was developed through hundreds years in history. One of the most beautiful mural paintings which were praised broadly is a mural painting at Wat Phumin. It had a major renovation in 1867 – 1874 during the reign of King Rama IV. The assumption showed that "Tid Buaphan" was a painter (Prabripoo, W., 2009). The content of the mural painting are about Lord Buddha biography and Buddha allegories. The mural painting of Wat Phumin was painted in realistic style and some paintings had a description in Tai Lue language which made plant species can be reliably presumed.

There are many researches and studies of mural painting at Wat Phumin such as tribes' costumes, fabric patterns, Buddha allegories analysis, but there is no research about plant species before. This is the first study of plant species from the mural painting at Wat Phumin, Nan province. Thus, we can collect database of plant species that found in Nan province during that time and evolving the unique 'Nan province' cultural landscape design.

### 2. METHODOLOGY

### 2.1 Making plants database

Wat Phumin chapel has 12 walls of mural painting as shown in Fig. 1. and Fig. 2. All plants were encoded.



Fig. 1. Wall addressing in Wat Phumin.



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Fig. 2. Mural painting on the wall number P02 (left) and number P05 (right).

### 2.2 Identify plants by physical consideration, literature review, and interviewing

Plants were classified in to groups by painting style, plant height, plant form, leaf color, leaf character, trunk color, and flower/fruit character. All classified plants were identified by 3 methods identify by Tai Lue language, identify from the biography of Lord Buddha and Buddha allegories, and identify by plant physical characters.

### 3. RESULT

Two-hundred and fifty-nine paintings plants were found. There are 20 hypothetical plant species from Wat Phumin mural painting as shown in Table 1.

Table 1. Plant species from a mural painting on Wat Phumin chapel and the methods to identify.

No.	Thai Name	Common Name	Scientific Name	Thai Lue language	Buddha allegories	Realistic painted
1	Mak song	Areca palm	Areca catechu			х
2	Phai	Bamboo	Bambusa sp.		х	х
3	Kluai	Banana	Musa sp.	Х		Х
4	Ma phrao	Coconut palm	Coccos nucifera			Х
5	Ngio	Cotton tree	Bombax ceiba			Х

6	Ueang mon khai	Dendrobium	Dendrobium thyrsiflorum			X
7	Bua luang	Indian lotus	Nelumbo nucifera		Х	х
8	Fai	Levant cotton	Gossypium herbaceum		Х	х
9	Parikchart	Parikchart tree		Х	Х	
10	Sapparot	Pineapple	Ananas comosus	Х		X
11	Khao	Rice	Oryza sativa	Х	Х	х
12	Pho si maha pho	Sacred fig	Ficus religiosa	Х		
13	Bo tan	Shrubby peony	Paeonia suffruticosa			X
14	Saba mon	St. Thomas's bean	Entada rheedii		Х	х
15	Oi	Sugar cane	Saccharum officinarum	Х		х
16	Tan	Toddy palm	Borassas flabelifer		Х	х
17	Nuat pla muek	Umbrella tree	Schefflera sp.			x
18	Phak nam	Unicorn plant	Lasia spinosa			х
19	Fak	Winter melon	Benincasa hispida			X
20	Man	Yam	Dioscorea sp.		Х	

### 3.1 Identify with Thai Lue language

A database analysis showed 6 groups of paintings had a description in Tai Lue language which can be identified correctly by make an interview with Thai Lue language specialist (Wimolkasem, S., 2014). There are Banana (Musa sp.), Parikchart tree, Pineapple (Ananas comosus) (Fig. 3.), Rice (Oryza sativa), Secred fig (Ficus religiosa), and Sugar cane (Saccharum officinarum).

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### 3.2 Presume from the biography of Lord Buddha and Buddha allegories

There are 8 groups of paintings were shown in biography of Lord Buddha and Buddha allegories -Khattana Kumara Jakata and Nimi Jakata --. There are Bamboo (Bambusa sp.) (Fig. 4.), Indian lotus (Nelumbo nucifera), Lavant cotton (Gossypium herbaceum), Parikchart tree, Rice, St. Thomas's bean (Entada rheedii), Toddy palm (Borassas flabelifer), and Yam (Dioscorea sp.).



Fig. 4. Bamboo was shown in Khattana Kumara Jakata.

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### 3.3 Assume by plant physical characters

There were 17 groups of paintings which painted in realistic style. All data were reviewed with consensus of the researcher (10 years experience in landscape architecture) and the senior botanist (Thaithong, O., 2011 -- member of royal institute, associate professor in Department of Botany, Chulalongkorn University). All painting plants were compared with the real photographs in textbook. There are Areca palm (Areca catechu), Bamboo, Banana, Coconut palm (Coccos nucifera), Cotton tree (Bombax ceiba), Dendrobium (Dendrobium thyrsiflorum), Indian lotus, Lavant cotton, Pineapple, Rice, Shrubby peony (Paeonia suffruticosa), St. Thomas's bean, Sugar cane, Toddy palm (Fig. 5.), Umbrella tree (Schefflera sp.), Unicorn plant (Lasia spinosa), and Winter melon (Benincasa hispida).



Fig. 5. Toddy palm, painting compare with a photograph.

### 4. DISCUSSION

The study found that there were 20 hypothetical plant species from Wat Phumin mural painting. Plants which were labeled in Thai Lue language are the most reliable to identify. Plants which were identified by related to the biology of Lord Buddha and Buddha allegories are the second most reliable. Identifying by plant characters is the most difficult method because many plant species have similar characters.

Tid Buaphan, the painter of Wat Phumin mural painting created many scenes where can presume that were inspired by Nan people daily life at that day. The painter showed it through costumes, architectures, way of life, etc. (Wimolkasem, S., 2013). Plants species are another way to support this hypothesis. They perfectly match when comparing with old Nan photographs. Old photographs showed Areca palm and Coconut palm were planted along city wall (Fig. 6.), Toddy palm could found in temple areas. If the painter had an inspiration from the natural scene of Nan environment, it can be assumed what plants were used in those scenes.

Nevertheless, old photographs showed many plants inside Nan city, there is no plant in every city on a mural painting. It can assumed that the painter wanted to show his architectural painted skill and did not want to show any plants in these scenes (Prabripoo, W., 2009).



Fig. 6. Areca palm and Coconut palm were planted along the city wall in mural painting compare to a real photograph. Nan city grew up Areca palm and Coconut palm along the city wall with combination of other trees that cannot be identified (modified from Office of National Archives of Thailand).

The study found that Areca palm, Banana, and Coconut palm were planted beside a house while Cotton tree, Levant cotton, Pineapple, and Rice were planted farther. All of plants which cultivated in these areas were consumable plants e.g. People had to cultivate Levant cotton for processed to clothes. Cotton trees were used to stuff in pillows before White silk cotton tree (Ceiba pentandra) was introduced to Thailand (Thaithong, O., 2011). In the same area, Children also used St. Thomas's bean for their amusement. Dendrobium, Unicorn plant, and Yam were found in pastoral scenes among many realistic painted plants which could not be identified (Fig. 7.). Furthermore, the Shrubby peony was a famous alien species flower at that time which believed it will give a good luck to anyone who planted until their bloom (Prabripoo, P., 2014).



Fig. 7. Dwelling area in mural painting.

Many scenes show agricultural products of Nan province. For example, people were carrying Sugar cane for elephants feeding which must be cultivated somewhere (Fig. 8.).



Fig. 8. People were carrying Sugar canes.

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Unfortunately the Parikchart tree is a tree in imagination which grows up in heaven according to Thai mythology. Though it can be ensured what is the kind of a plant in mural painting, it cannot be identified in a real world.

There are other interested scenes which were found in mural painting but they did not have any clues or photographs to compare with. For example, Big trees were planted beside the road in a city and along the road where used for soldiers march (Fig. 9.). This scene was painted more than 40 years before Yang trees (Dipterocarpus alatus) were planted on Chiangmai-Lamphun road but it had no clue to presume.



Fig. 9. Big trees were planted along the road.

Moreover, seven of identified plants were alien species which introduced to Thailand in the past (Smitinand, T., 2014). Alien species plants from a mural painting are Coconut palm, Levant cotton, Pineapple, Sacred fig, Shrubby peony, Toddy palm, and Winter melon. There were already planted in Nan province a hundred years ago.

### 5. CONCLUSION

The study found 20 plant species in Wat Phumin mural painting. They have a potential not only to use in landscape architecture design for Nan city and housing but they can also use in Wat Phumin landscape design to show sample plants from Buddha allegories. Moreover these plants can be represented species which used in Nan landscape during the time of King Rama IV and King Rama V. They can be added in plants selection guideline for cultural landscape architecture in archeological sites where placed at that time.

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# Water and Green as a source for Urban Regeneration

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### ABBREVIATION

Bundhs- Bundhs are embankments or kind of check dams to tap, Rainwater runoff from natural slopes of Hills and in case of Delhi, The ridge. They were usually placed at a distance of a "KRUH" which means approximately two miles. The network spreads all along 40 miles distance of Delhi ridge.

Baolis- Step wells

Kunds- A kund or kundi looks like an upturned cup nestling in a saucer. These structures harvest rainwater for drinking, and dot the sandier tracts.

Dighis - traditional water harvesting system

Baoris- Baoris or bers are community wells, found in Rajasthan, that are used mainly for drinking. Most of them are very old and were built by banjaras (mobile trading communities) for their drinking water needs. They can hold water for a long time because of almost negligible water evaporation.

Quila-Fort

Hauz- Royal Water Tank

Jharna - Cascade

Gandak - Sulphur

Satpula- Seven Bridges

Barapulla- Twelve Bridges

Talab- Pond

Mori - regulated apertures

Sthal- Place

Water and Green as a source for Urban Regeneration

Intekhab Alam

### ABSTRACT

The history of landscape design of a region is about the changing relationship of human beings with nature over a period of time, a relationship which then manifests itself in various design forms. It is less about dates and time spans and more about the intrinsic connections of the landscape with the history of people and their culture, which includes their science, art and literature.

In a fast growing city like Delhi, the place of nature is very challenging. On one hand, it forms the core framework based on which the city develops while on the other hand, it faces serious challenges in the realm of urban development. The research document attempts to construct a perspective to recognize the role and value of nature in making of our cities more livable. On the way, the educational work delves on the natural history, relationship of nature with culture and lists and maps ecologically significant areas (both natural and manmade) in the city. The knowledge of the natural context and the relationship with Blue, Green and culture will enable citizens to observe and analyze present day development opportunities and concerns in a much more sensitive and balanced manner in which Urban Regeneration of city's natural resources holds equal value.

### Keyword: Urban Regeneration, history, nature

### **1. INTRODUCTION**

The traditional water harvesting systems of the city were not only water carriers but also imprints of histories, traditions, and cultures. The cities of Delhi (Lal Kot, Mehrauli, Siri, Tughlagabad, Jahanpanah, Firozabad, Dinpanah, Shahjahanabad, New Delhi) which emerged during the period thirteenth to eighteenth centuries were dependent on the traditional water bodies. The fortress cities had elaborate water and green management systems included wells, step wells, water tanks etc., to meet the drinking water needs of the residents and they were bounded by the cultural practices associated with the Blue and green.





The citizen of Delhi had reaped immense economic, defensive and environmental benefit, from successful management of the natural resources. It inherited the knowledge of city's hydrological resources through a comprehensive understanding of Delhi's terrain and ecosystems. Delhi's natural terrain acted as the main key for water supply. Technological limitations allowed a gradual learning process through incremental improvements and interventions. Planning was site-specific and passed down with experience. Delhi's natural arid terrain in this matter tended to sustain a large urban conurbation, camping armies and local agriculture.

The other aspect which combined the Green and Blue of the city was the layer of culture in the city, Culture associated with the natural resources. In India most of the festivals are celebrated around the seasons, Water is worshipped in many parts of the country still, many religious rituals are incomplete without water system, on the other hand sacred forest play an important role in the ecological narration of the country and almost all the cities are somehow or the other related to these forests.

### 2. SEVEN CITIES OF DELHI

'A city like Delhi!Hills around it and a river in its midst!!'- Amir Khusrao inWasat UI Hayat



Fig2- Delhi with its environs in the early seventeenth century, Map Showing Seven Cities of Delhi and it's Water Sources, Source: Nature in the city, Mapping nature in its history, Landscape Foundation India

The section discusses of the seven cities of Delhi with respect to the water system adopted by each one of them in detail. The initial four cities of Delhi was not dependent on Yamuna for its water resource but had mechanism to harvest water and use it throughout the year. In fact during the study it was found that historically Delhi had numerous streams now converted into sewer drain. Historically all the initial six cities respected the water system built by the later and added on to it.

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### 2.1 LAL KOT QILA RAI PITHORA (972-1150)

One of the first capital settlements of Delhi followed by the walled city of the Delhi Sultans which was simply called Dehli or Dehli-i-Kuhna (old Delhi). The old city of Lal Kot also housed Anagtal one of the earliest water harvesting structures.

Medieval Delhi rulers inherited and extended a vital tradition of hydraulic engineering that could be traced to Pre Sultanate period. The system was largely based on water harvesting through the use of check dams, wells, baolis and bundhs. Although most waterworks in Delhi can be dated only as early as the Delhi Sultanate (1206-1526), the first Islamic dynasty in India, LalKottal, Anangpur and Mahipalpur dams are attributed to the pre-Sultanate period.



Fig 3 The famous SurajKund and Anangtal lakes in this area are associated with King Anangpal and Surajpal respectively, and are fine examples of water harvesting during the pre-Sultanate period. Source: Author

### 2.2 MEHRAULI 1191-1290

Elaborate water harvesting systems e.g Hauz-e-Shamsi the Jharna Stepwells- Rajon Ki Baoli and Gandhak Ki Baoli. Mehrauli relied on water bodies like Hauz-e-Shamsi built by Altamash and the Naulakha Nala as well as other streams which emerged from the ridge to meet its water needs.

During the Sultanate period that followed, several cities were built in the terrain of the Aravali hills. One major commonality was that all these cities, forming the collective history of today's had wide-ranging water harvesting systems, which made it possible for the people residing to meet their daily needs Delhi.

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Fig- 4- Rajon Ki Baoli, Mehrauli, Source: Author

### 2.3 SIRI 1296-1320

The Hauz-e-Khas built by Ala-ud-Din Khilji was fed by a couple of streams both perennial and seasonal, some running through the present IIT campus. Ibn Battuta, who was in Delhi during this time, describes the scale of Hauz e Khas: one mile by two miles. These streams were collected in the depression to meet the water requirements of the garrison town at Siri. The water which flows down from Mehrauli through the present Aurobindo Marg, was directed into the Hauz. The stormwater drain system of the present days drains straightaway to the Yamuna



Fig- 5- A remain of a bridge near Siri, Source: Author

The typical Hauz used to derive its water from two sources; in areas nearing the river Yamuna, from underground subsoil water movement and the ones at a distance from the river, from the harvesting of rainwater or storm-water runoff during the monsoons and gradually used later during drier periods. Prominent among these were Iltutmish's Hauz-i-Sultani or Hauz-e-Iltutmish, which served as a remarkable water tank meant for public use. This tank was further repaired by Emperors AllaudinKhiljee and Feroz Shah Tughlaq during their times, suggesting the continued importance of this huge water reservoir. That Delhi had plenty of water in the past is corroborated by a study conducted in 2000, which discovered 15 water harvesting dams which define a network of 25 water structures along forty miles of the Delhi ridge - from Zamrudpur and Tughlagabad in the south to Wazirabad on the Yamuna.

### 2.4 TUGHLAKABAD (1321-1334)

The grand fort with a perimeter of 6.5 kilometers sits in a large plain, surrounded by a moat. During the monsoon the moat used to be filled by water coming from high catchment basin surrounding the fort, transforming it into a shallow lake. This was also used to protect the fort and to isolate and accentuate water system which was part of a grand design. Muhammad Shah Tughlaq built his fort of Adilabad on the opposite hill, to the south of the lake. A path above the barrage connected the two forts and sluice gate built into the barrage regulated the overflow of the lake into the river Yamuna.

The water was used for irrigation by the peasants living to the east of the two forts and the lake. The city had built many many reservoirs, kunds and baolis inside its fortification. It had an elaborate network of dams and sluice gates that was integral to the whole defensive scheme.



Fig- 03 Layout Plan- Tughlaqabad, Source: Nature in the city, Mapping nature in its history, Landscape Foundation India

The Tughlaqabad fort was built on the Aravallis using the lake as a moat. The fortified city depended on kunds, baolis (wells, step wells) natural and manmade lakes and on the streams that fed the Yamuna and not on the river itself as it was fairly far. The peasants who lived outside the fortified cities depended on the streams. Some of these water bodies were believed to have miraculous healing powers.

### 2.5 JAHAPANAH 1334-1351

Satpula dam/reservoir to harvest and regulate rain water for irrigation purpose and water tanks for drinking water. Muhammad-bin-Tughlaq (1325-51 AD) inherited Delhi with three competing habitations, and added a fourth one to it - Jahanpanah – which means the shelter of the world. The Satpula (meaning seven spans) was built to regulate water supply for irrigating the area falling outside the city. Built across the southern wall of Jahanpanah, it is a dam towering 64.96 m above ground level. Its seven principal spans were sluices that controlled the water in an artificial lake.)

800 metres east of the Khirki Masjid, integral part of fourth city of Jahanpanah in Delhi. Satpula is a remarkable ancient water harvesting dam or weir located about 800 m (2,625 ft) east of the Khirki Masjid that is integral to the compound wall of the medieval fourth city of the Jahanpanah in Delhi, with its construction credited to the reign of Sultan Muhammad Shah Tughlaq (Muhammad bin Tughluq) (1325–1351) of the Tughlaq Dynasty.

### 2.6 FIROZABAD 1351-1388

Located on the western bank of river Yamuna. Well watered for the first time. The construction of the fourth city of Delhi was initiated by the Tughlaq ruler Firoz Shah Kotla. The city was established adjacent to the River Yamuna. The attraction of the Firoz Shah fort is the Ashokan pillar at the top. He builds various structures and restored old buildings at Mehrauli and Hauz Khas. The tomb of Firoz Shah is present at Hauz Khas.

After the death of Firoz Shah, the Sultanate of Delhi falls under the shadow of uncertainty. Delhi faced a large number of attacks. There were a lot of political disturbance and in 1398, Timur of Samarkand attacked Delhi. That attack stunned not only Delhi but most of the North India. And the situation of Havoc created among the public.

### 2.7 DINPANAH 1530-1540

harvesting structure of this period.

The second Mughal Emperor Humayun in the year 1533 A.D. founded the city of Dinpanah (Refuge of the Pious). This he did after holding consultations with various learned men and various scholars. The city was also located in very close proximity to the shrine of Delhi's most revered saint, Nizam ud Din Auliya. The belief of local Hindu populace that the mythological city of Indraprastha existed on that very spot also could have contributed to the decision to build the city where it was made. When emperor Humayun lost the throne of Dinpanah (Delhi) and Sher Shah Suri took over, he brought down the portions of the city constructed by Humayun and rebuilt it himself, and re-named the city as Shergarh.Located on the western bank of river Yamuna Ugrasen Ki Baoli is a remarkable water

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### 2.8 SHAHJAHANABAD 1638-1648



Fig- Delhi Environs, post 1857, Source: Nature in the city, Mapping nature in its history, Landscape Foundation India

Shahjahanabad, a walled city with the fort, occupies a flat piece of land between two hillocks, northern Ridge and another on which Jama Masjid was constructed. The entire wastern wall of the city with its fort, Red Fort, overlooked the Yamuna riverfront. In the city, the water supply system was still through Western Yamuna Canal (from Hissar), wells, baolis and tanks while moats running along the fort wall and along the city periphery were fed by river.

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There was plenty of water inside the fort in the ornamental channels (Hayat Baksh, Nishat) waterfalls and fountains irrigating its gardens. In the city, a system of channels (Chandni Chowk) flowing through the canals that cris- crossed the streets, gardens and havelis formed the water supply infrastructure of the city. Shahjahanabad was the greatest Mughal contribution to Delhi's water heritage. It encompassed the Yamuna waterfront, the western Yamuna canal, parallel urban canals, an array of fortress waterworks, and urban drains.



heritage associated with water body in the city. Restore derelict landscape areas. The new heritage corridor along the natural storm water drain corridor can give a immersive experience of being able to go back in time and space. The water stream skirts around most of these ancient cities- which earlier would have been the edge- but now can afford a linear physical landscape connection.

### 2.9 NEW DELHI (1931- PRESENT)

The Indian landscape underwent a complete transformation in the colonial period, brought about because of very different responses to and understanding of nature, largely guided by one phenomenon-"industrialization", which by its inherent logic at the time implied exploitation of natural resources. Additionally, as part of the subjugation narrative intrinsic to colonization, there was almost a complete negation of the traditional patters of design which included landscape design.

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Fig 3- Shah Alam Bridge, the case of neglected heritage structure in the city Reviving the neglected

After India's Independence in 1947. Delhi became a refugee city with many colonies coming up to house those displaced by Pakistan during Partition. It exploded into a megacity with severe stress on the natural resources. The Ridge became prey to rampart urbanization and gradually became fragmented. Its ecology got disrupted with indiscriminate and unscientific denudation of forests.



Fig- 2 Layout Plan of Delhi – 1912, Source: Nature in the city, Mapping nature in its history, Landscape Foundation India

### 3. CONCLUSION

Nature has always been very vibrant, giving and resilient to a very large extent. We, as Indians, take pride in our strong cultural heritage. In fact, whole civilisations have come into existence near sources of water like Indus Valley Civilisation. In this sense, nature and culture become intertwined. Culture reflects our history, tradition and our beliefs. Revolutions in the technological and communication fields and the advent of globalisation have made an impact on our culture which has also evolved with time.

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However, it becomes imperative that we adapt new things without losing the basic character of our long cherished traditions and values which include environmental conservation. India is a culturally rich and diverse country where people speak many different languages, with many communities which live in their respective social structures completely depending on their environment to ensure their livelihood. At the national level, Article 48(A) of the Indian Constitution imposes a constitutional obligation on the state to protect and improve the environment and safeguard the forests and wildlife of the country. Article 51(A)(g) imposes a constitutional obligation on the citizens of India to protect and improve the natural environment, including forests, lakes, rivers and to have compassion for all living creatures.

Hence, we are faced today with the challenge of not only industrialisation, liberalisation and urbanisation but also to make sure that fresh air and clean water are available to our people. This is possible only by active participation both by the government and the people in resource conservation and management. This requires political will, education, and a change in the mindset of the people at large. Conservation of natural resources and culture can be achieved only through the empowerment of indigenous communities and their development. This also puts an additional responsibility on individuals to not only protect, preserve and promote cultural heritage and traditional knowledge, but also to lead the world in environment conservation through sustainable development through the ages.



Fig- Colonial Delhi, Bird's eye view of India Gate, Source: Author

This can be done through multidisciplinary teams comprising of ecologists, naturalists, landscape architects, architects, environmentalists, biologists and engineers. Identify areas for wildlife conservation and enhancement. The Ridge and as well as the riparian ecosystems be restored and linked and to be connected to the city and people.

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# Trees are the Earth's endless effort to speak to the **Listening Heaven**

### ABSTRACT

Trees are living monument of nature and worshipping them is probably the oldest form of religion, documented in ancient societies all over the World, because of their shear magnificence, antiquity and benefits to humankind on earth. The worship of plants is an ancient phenomenon in India, too. The earliest form of worship was probably the veneration of a single tree, line of trees, cluster of trees, groves and woodland/forest. Especially, among the Tamils "Trees were the embodiment of divinity; in them, Gods dwelt and had to be worshipped" (Agam, 270.12;7; Puram, 191.1; 198). Many villages set apart sanctified land to propitiate the vanadevatas .i.e. tree spirits. The two notable traditional institutions of tree worship by the Tamils were Kovilkadu or "Sacred Grove", and Sthala Vriksha or "Sacred Tree" of a temple. These institutions has Indian Banyan, Sacred Fig and Neem as its Keystone tree species with reverence to unique residing deity Amman, Goddess of fertility/good health and Ayyanar, God of protection and security with vernacular folklore narratives which persist to the present day. In totality these institutions and its Keystone tree species has important role ecologically, socio-culturally, religiously, and politically on the local communities in various districts of Tamil Nadu State. India.

This idea submission aim at an overview of the Ecological services i.e. Ecosystem services, defined as "the benefits that humankind derives from nature or ecosystems". Especially, from the three Keystone tree species through study and documentation of its importance to conserve them, to continue providing life support essentials like clean air, water, soil fertility, biodiversity. As these "Trees are the earth's endless effort to speak to the listening heaven" from the Indian sub-continent for the world.

Keywords: Sacred Grove, Sacred Tree, Keystone Tree Species, Ecosystem Services

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### **1. INTRODUCTION**

The Tamil Sangam literature reveals that traditional Dravidian society through generations have evolved many conservation practices such as restriction of exploitation of a resource only to a certain period or season, restriction of exploitation to certain stages of life history and behaviour, partial exploitation of certain resources, protection of certain "Sacred" Keystone tree species like Indian Banyan (Ficus benghalensis), Sacred Fig (Ficus religiosa) and Neem (Azadirachta indica), thus the entire ecosystem. The study and documentation bring to limelight the important benefits these three Keystone tree species offer to well-being of the humankind, calls for awarness to plant and protect them individualy and as a community in this modern era.

### 2. ECOSYSTEM SERVICES AND ITS CONSTITUENTS OF WELL-BEING

In the early 2000s the Millennium Ecosystem Assessment (MEA) and The Economics of Ecosystems and Biodiversity (TEEB) grouped ecosystem services into four broad categories: Provisioning services are the products obtained from ecosystems such as food, fresh water, wood, fiber, genetic resources and medicines. Regulating services are defined as the benefits obtained from the regulation of ecosystem processes such as climate regulation, natural hazard regulation, water purification and waste management, pollination or pest control. Habitat services highlight the importance of ecosystems to provide habitat for migratory species and to maintain the viability of gene-pools. Cultural services include non-material benefits that people obtain from ecosystems such as spiritual enrichment, intellectual development, recreation and aesthetic values.



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### 3. HIGHLIGHTS ON THE THREE KEYSTONE TREE SPECIES 3.1 KEYSTONE TREE SPECIES - I

Binomial Name	: Ficus benghalensis L.
Common Name : Indiar	n Banyan (English) Aal (Tamil) Vata (Hindi)
Kingdom	: Plantae, Angiosperm
Order	: Rosales
Family	: Moraceae
Genus	: Ficus
Species	: Ficus benghalensis
Morphological features	: Large spreading tree,eve broadly oval with rounded smooth when mature. Fig axis;large,round, faintly d
Distribution	: Indian Subcontinent
Revered as Sthala Vriks In temple at place	ha : Thirualangadu
Mythological and Religious Association :	Lord Shiva as Dakshinamu

Figure 2 : Ficus benghalensis L. (Indian Banyan) 351 I 2017 IFLA Asia Pacific Regional Congress

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ergreen, greyish bark, upto 20cm long leaves d base, translucent pink hairy at first, mostly s without stalks, in pairs from leaf owny, rich red when ripe, ariel prop roots.

urti (Guru),worshipped to enable women to avoid the stigma of widowhood



### 3.2 KEYSTONE TREE SPECIES – II

### 3.3 KEYSTONE TREE SPECIES - III

Binomial Name	: Ficus religiosa L.	Binomial Name	: Azadirachta indica A.Juss.
Common Name	: Sacred Fig (English) Arasu (Tamil) Pipal (Hindi)	Common Name	: Neem (English) Veppam (Tamil) Nimgachh (Hindi)
Kingdom	: Plantae, Angiosperm	Kingdom	: Plantae, Angiosperm
Order	: Rosales	Order	: Sapindales
Family	: Moraceae	Family	: Meliaceae
Genus	: Ficus	Genus	: Azadirachta
Species	: Ficus religiosa	Species	: A.indica
Morphological features	<ul> <li>Large tree,semi-deciduous, greyish brown bark, upto 15 cm large leaves wavy margin and long stalks; hearth shaped at base with long,pointy tip; shiny on top. Figs in pairs, from leaf axils;reddish at first and eventually deep purple when rip.</li> <li>Indian Subcontinent</li> </ul>	Morphological features	: Large size tree, semi-even brown bark, rough, vertical feathery-compound with 4 toothed leaflets plus on te Flowers with five spreadin fused in a central column, yellow when rip.
Revered as Sthala Vriks	ha : Thiruarasili	Distribution	: Indian Subcontinent
Mythological and	· Lord Vichnu horn under this tree and wershipped	Revered as Sthala Vriks in temple at place	sha : Thiruthayur
	by women for fertility, protection and longevity.	Mythological and Religious Association	: Sakthi (Mariamman) and w Mythological – "Wish fulfillin The Vedas call it as "SARV ailments and ills".

Figure 3 : Ficus religiosa L. (Sacred Fig)

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ergreen, Dark grey cally furrowed,Leaves 4-8 pairs of curved terminal leaflet. ling white petals;stamons n,fruit upto 2 cm long;

worshipped for fertility and good health. Iling Tree" and 'Tree - Bestow good health' VA ROGA NIVARINI", meaning- "one that cures all

### Trees are the Earth's endless effort to speak to the Listening Heaven



Figure 4 : Azadirachta indica A.Juss. (Neem)

## 4. ECOSYSTEM SERVICES : THREE KEYSTONE SPECIES OF TAMIL NADU STATE

Ecosystem Service and categories		Ecological Role/function	Description of benefit
	Food	Food for birds, insects and small mammals. Leaves as fodder for livestock, especially sheep and goats.	Well-being of birds and animals to keep up the ecosystem
1 	Leaves	Dried leaves stitched together with twigs as dinner plates	Eco-friendly products and positive environmental benefits
Provisioning	Wood/Timber	Paper pulp, Furniture making and fuel wood	Eco-friendly products and as fuel for holy fire
	Bio-Chemicals	High in bio-chemical enzymes and harmonic substance	Environment-friendly applications like natural pesticides
	Medicine	Treatment of varied ailments	Physical well-being of individual/family/community
	Economic	Increase crop and agricultural produce	Financial well-being of individual/family/community
	Bio-control	elimination of pest	Pest management and control
	Climate	Amelioration of climatic factor and anti-microbial purifier	Well-being of individual/family/community
	Health	Fertility and Paternity	Well-being of individual/family/community
Regulating	Water	Reduction of surface run-off co-efficient	Increases recharge of water table and avoid floods
services	Erosion	Increase soil fertility and humus	Soil quality enhancement through leaf litter
	Multiple	Reduction in air temperature by 1.33 degree Centigrade	Shade for people/animals and enhancement of microclimate
	supporting and regulating	Effective mulch for soil moisture and temperature by 5.85 degree Centigrade	Soil fertility and enrichment of micro organism
Habitat	Migratory Birds	Habitat and breeding ground	Multiplication, Well-being of birds and animals to keep up the ecosystem
services	Gene-pool	High Genetic diversity	Increases chance of biological fitness and survival
	Spiritual enrichment	Reverence	Propitiation of deity/spirit
Cultural services	Intellectual development	Psychological strength	Moral support and guidance
	Recreation	Healthy cultural space to the community	Common property resource for public meetings, religious feast and recreational values
	Political	Establishing new alliance	Assertion of group identity/solidarity
	Aesthetic value	Visual pleasure	Landmark / Foci

Table: 1 Keystone Tree Species – I Binomial Name: Ficus benghalensis

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## Table: 2 Keystone Tree Species – II Binomial Name: Ficus religiosa

Ecosystem Service and categories		Ecological role/function	Description of benefit	
	Food	Food for birds, insects and small mammals. Leaves as fodder for livestock, especially sheep and goats.	Well-being of birds and animals to keep up the ecosystem	
	Leaf fiber	High impact strength fiber /rope from bark	Positive environmental benefits	
Provisioning services	Wood/Timber	Paper pulp, handicrafts and fuel wood	Eco-friendly products and as fuel for holy fire	
	Bio-Chemicals	High in bio-chemical enzymes and harmonic substance	Environment-friendly applications like natural pesticides	
	Medicine	Treatment of varied ailments	Physical well-being of individual/family/community	
	Economic	Increase crop and agricultural produce	Financial well-being of individual/family/community	
	Bio-control	Elimination of pest	Pest Management and control	
	Climate	Amelioration of climatic factor and supply of Oxygen (day and night)	Well-being of individual/family/community	
	Health	Fertility and Paternity	Well-being of individual/family/community	
-	Water	Reduction of surface run-off co-efficient	Increases recharge of water table and avoid floods	
services	Erosion	Increase soil fertility and humus	Soil quality enhancement through leaf litter	
	Multiple supporting and regulating	Leaves move continuously even, air around is still and no perceptible wind is blowing	Shade for people/animals and enhancement of microclimate due to constant promotion of wind flow in warm humid climatic zone	
		Effective mulch for soil moisture	Soil fertility and enrichment of micro organism	
Habitat	Migratory Birds	Habitat and breeding ground	Multiplication, Well-being of birds and animals to keep up the ecosystem	
services	Gene-pool	High Genetic diversity	Increases chance of biological fitness and survival	
Cultural services	Spiritual enrichment	Enlightenment	Propitiation of deity/spirit, self realization	
	Intellectual development	Psychological strength	Moral support and guidance	
	Recreation	Healthy cultural space to the community	Common property resource for public meetings, religious feast and recreational values	
	Political	Establishing new alliance	Assertion of group identity/solidarity	
	Aesthetic value	Visual pleasure	Landmark / Foci	

Ecosystem Service and categories		Ecological role/function	Description of benefit
Provisioning services	Food	Food for birds, insects and small mammals.	Well-being of birds and animals to keep up the ecosystem
	Leaves	Leaves antiseptic, anti- fungal, antiviral and anti- bacterial effect.	Positive environmental benefits
	Wood/Timber	House Construction, Furniture making, toys and handicrafts	Eco-friendly products
	Bio-Chemicals /Oil	Azadirachtin used in agriculture, public health and cosmetics	Environment-friendly applications like natural pesticides and base for cosmetic products
	Medicine	Treatment of varied ailments	Physical well-being of individual/family/community
	Economic	Silvopastoral system involving production of forage grasses and legumes	Financial well-being of individual/family/community
Regulating services	Bio-control	Elimination of pest	Powerful in pest control and management
	Climate	Amelioration of climatic factor, anti-microbial purifier, balance oxygen level in atmosphere and effective windbreaker	Well-being of individual/family/community
	Health	Products produce no ill- effects to humans and animals	Well-being of individual/family/community and domestic animals
	Water	Reduction of surface run-off co-efficient	Increases recharge of water table and avoid floods
	Erosion	Increase Soil fertility , less salinity and prevent erosion	Soil quality enhancement through leaf litter in agro-forestry
	Multiple supporting and regulating	Reduction in Air temperature by less than 10.00 degree Centigrade	Shade for people/animals and enhancement of microclimate
		Rehabilitation of degraded ecosystem and wastelands	Soil fertility and enrichment of micro organism
Habitat services	Migratory Birds	Habitat and breeding ground	Well-being of birds and animals to keep up the ecosystem
	Gene-pool	Serves as a refugee to many beneficial organisms, bats, birds, honey bees, spiders	Increases chance of biological fitness and survival
Cultural services	Spiritual enrichment	Fertility and Paternity	Propitiation of deity/spirit
	Intellectual development	Psychological strength	Moral support and guidance
	Recreation	Healthy cultural space to the community	Common property resource for religious feast and recreational
	Aesthetic value	Visual pleasure	Landmark / Foci

### Table: 3 Keystone Tree Species – III Binomial Name: Azadirachta indica

### 5. CONCLUSIONS

The above study and documentation reveal the unlimited benefits that these three Keystone tree species offer towards Ecosystem Services. It is to conclude that all the above factors indicate that the protection of these three Keystone tree species is essential for maintaining local/regional bio-diversity and for its varied ecosystem services to humankind for sustenance and well-being, comprehensive health of a landscape, and preserving the socio-cultural integrity of local communities. Hence, it is imperative to create awareness among individuals and local communities to plant, conserve and to maintain them as "Living Monuments of Nature" either, in-situ in form of cluster or groups, line of trees as "Sacred Grove", neighbourhood parks and avenues or ex-situ as a single tree in the form of "Sthala Vriksha" in Hindu temples, front/backyard of home and private garden as these "Trees are the earth's endless effort to speak to the listening heaven" from the Indian sub-continent for

the world.

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# Redefining Biophilic Design Approach in a Philippine Setting: A Case Study of Long-term Care Facility

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### ABSTRACT

In the Philippines, there are an estimated five million Filipinos aged 60 years old and above. Older persons comprise a little over 6% of the total population, but the proportion is expected to be more than 10% by the year 2020 as the number of older people will double by that time (NEDA, 2009). The role of geriatric care is very limited as there are very few homes for the elderly, and geriatric wards are rare in hospitals. According to Charmie Pagulong (2015), Quality of Death study index attributed to a shortage of palliative care, lack of government-led strategy for the development and a limited number of government programs for individuals seeking palliative care services and long-term care for the elderly.

Stephen Kellert explored links between people and nature. Also, helped pioneer the concept of Biophilic design, a design philosophy that encourages the use of natural systems in designing of the built environment. It proposes that humans have an innate connection with nature and that the exposure of an individual to the natural world is important for an individual's well-being.

The purpose of the study aims to redefine Biophilic design based on three comparative related literature that will evaluate a range of attributes, applicable to a long-term care facility located in a rural area that offers a multi-sensory attribute in response to design application as a way to effectively enhance health and well-being for individuals. The findings of this study will contribute to building a better society for older people through multi-sensory experience, where individuals live, work, and learn as a way of restorative care.

Keywords: Biophilic Design; Biophilia; Assisted Living; Long-term Care Facility; Case Study

- 1. INTRODUCTION
- 1.1. Background of the Study

In the Philippines, there are an estimated five million Filipinos aged 60 years old and above. Older persons comprise a little over 6% of the total population, but the proportion is expected to be more than 10% by the year 2020 as the number of older people will double by that time (NEDA, 2009). Also, the Coalition of Services of the Elderly Inc., which advocates better care for senior citizens, warned recently that a crisis looms in elderly care. According to The Coalition of Services of the Elderly Inc., the elderly has become the fastest growing sector of the Philippine population.

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# SECTION 4 LANDSCAPE SENSATION AND PERCEPTION

Camille Lily C. Cheng<sup>1</sup> and Joshua S. Cunanan<sup>2</sup>

The Philippines has recorded as one of the worst places to die based on the 2015 Quality of Death Index, next to Iraq and Bangladesh. According to The Economist Intelligence Unit report, commissioned by Singapore, a nonprofit foundation, reported that the Philippines scored poorly regarding the quality of end-of-life care available for the elderly.

### 1.1.1. Statement of the Problem

The role of geriatric care is very limited as there are very few homes for the elderly, and geriatric wards are rare in hospitals. In the Philippine culture, Filipinos customarily value the extended family which ensures care for people as they grow old. However, over the years, the extended family system has weakened.

## 1.1.2. Objective of the Study

The purpose of the study aims to redefine Biophilic design based on three comparative related literature that will evaluate a range of attributes, applicable in the local setting. The site should offer multi-sensory attributes in response to design application as a way to effectively enhance health and well-being for individuals.

In order to achieve the goal, the objectives of the study are as follows:

- 1. To evaluate the existing related literature with the application of Biophilic design.
- 2. To identify the suitable attributes of biophilic design to be applied in a local setting.
- 3. To apply the redefined biophilic design in a local setting.
- 4. To redesign existing nursing homes with the intention of restorative care for the benefit of the elderly population.

### 1.1.3. Scope and Limitation of the Study

The study does not intend to solve any issues related to politics, culture and other issues. Also, the research is limited by the time constraint which contributes to the factors.

The study explores the possibility of redefining biophilic design based on three comparative related literature that will define the best-suited attributes in a localized setting.

The study is limited to solving the current problems of long-term care facilities in the Philippines. The study shall not take into account the validity of the project since the experience of the individual is based on the infirmities of the beneficiary which is subjective, depending on the individual.

### 1.1.4. Significance of the Study

According to Stephen Kellert (2008), biophilic design proposes that individuals should have an innate connection with nature. Also, exposure of an individual to the natural world is important for an individual's well-being. By applying biophilic design to a long-term care facility, this could help speed up the healing process of the patients.

The findings of this study will contribute to building a better approach in designing nursing homes especially for the elderly population through various multi-sensory experience, where individuals live, work, and learn as a way of restorative care. To attract support from the local government in the Philippines including the Department of Health and Department of Social Welfare that would cater to the needs of the beneficiaries. Also, with the possibility of enhancing the living conditions of long-term care facilities throughout the Philippines.

### 2. REVIEW OF RELATED LITERATURE

Biophilic Architecture, The Concept of Healthy Sustainable Architecture By Dr. Arch. Amjad Almusaed, Dr. Ing. Asaad Almssad, Dr.Adm. Zaki

The paper talks about what Biophilic Architecture has to offer, in order to achieve environmental, social, moral, and economic benefits. This new movement aims to create an environmental friendly, energy-efficient developments by effectively managing natural resources of the site. The main objective is to outline each attributes and put them into an organized format for designers can learn more about the importance of human connection to the natural environment in all their designs.

Loving Nature from the Inside Out: A Biophilia Matrix Identification Strategy for Designers By: Beth McGee, MS and Anna Marshall-Baker, PhD

The authors discussed that this matrix seems useful in documenting biophilia within the pediatric healthcare context, attesting to the usability and functionality of the BDM for this special population. It was revealed that biophilic attributes were constantly present in some spaces while others were completely absent. When a biophilic attribute was present, the BDM indicated that they varied considerably in type and occurrence. Lastly, further use of the BDM as a tool for strategizing biophilic feature inclusion can thus increase the connections available with nature in the interior, beneficial for optimizing health and wellness.

14 Patterns of Biophilic Design By William Browning, Hon. AIA, Catherine Ryan, Joseph Clancy

The paper progressed from research on the different kinds of biophilic responses to the design application as a means to effectively enhance the well-being and health of the user and society. By categorized each pattern to lay out a sequence of devices for considerations on how to use each pattern which was divided into 14 patterns. The patterns were developed through extensive research and are supported by the work of various authors such as Stephen Kellert, Roger Ulrich, etc. Figure 1 is the chart of the 14 patterns which have a wide range of applications for both exterior and interior environments, and are meant to be adaptive and flexible for implementation.

### **3. RESEARCH METHODOLOGY**

The methodology will start with an initial analysis of biophilic design, where the proponent will conduct data gathering and concepts related to the study through multiple literature and shall finalize the ideas, based on the attributes applied to study and analysis created by the proponent, showcasing the results of the study with redefined biophilic design applied in a Philippine setting.



Fig. 1. Research Framework

### 4. RESULTS

According to Nathan Johnson, based through his extensive research incorporating plants in the building's design can expand its general thermal performance, while planning green inside spaces will make the occupants more joyful and beneficial. These are a portion of the cases originating from late reviews on biophilic architecture.

BE	ATTRIBUTES	NATURE IN THE SPACE
Des		Environmental
respo	Presence of water	Features
	Thermal and Airflow	
Improve me	Views of Nature	
Enhance of		
	Plants	
Health a	Natural light	Light and Space
S	Warm Light	
Emotional sti	Spatial Variability	
	Inside-outside space connection	
		NATURAL ANALOGUES
	Trees	Natural Shapes and Forms
	Biomimicry	
	Botanical Motifs	
		NATURE OF THE SPACE
Humar	Sensory Variability	Natural Patterns and Processes
	Central Focal Point	
Provide acc to	Transitional Space	
	Hierarchically	
	Organized Spaces	
		Human-Nature
	Prospect and Refuge	Relationships
Reflects the discovery	Curiosity and enticement	
Elicit i	Exploration and	

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### Table 1. Biophilic Design Criteria Compatible for Philippine Setting

### NEFITS DESIGN FEATURES

chological onsiveness

Fountain, small creek, meadow Natural ventilation

ental attentiveness

comfort and wellbeing

Greenhouse

and productivity

Security

and intellectual imulation

> Porches, atriums, and interior gardens

Suggests a forested setting

Designs borrow from adaptations found in nature

Foliage, shrubs, and bushes

n satisfaction

Sensory environmental conditions

Presence of a centrally perceived focal point

cess from one are another

Thresholds, doors, and fenestration

Connection of spaces from one area to another Natural environment's ability to provide a secure setting

human need for and creativity

interest and preciation

Biophilic architecture, which contends that human wellbeing and health has an organically based need to offshoot with nature through fabricated frame, additionally helps the wiped out improve faster and urges office laborers to take less debilitated days, say a few specialists from the United States. (Johnson, 2014)

### **4.1 Initial Findings**

The findings of the study are based on the concept of universal design and grounded theory, where systematically gathered data are analyzed through the research process. The data gathered by the proponent are based on the comparative analyses and the attributes of biophilic design cross referenced with the site criteria of long term care facility in the Philippines. In order to create redefined criteria of biophilic design.

MONTALBAN, RIZAL	ANTIPOLO	MUNTINLUPA
648,495	648,495	468,876
MEDIUM	MEDIUM	HIGH POTENTIAL
Temp. Increase (C) 0.2 TO 0.5	0.2 TO 0.5	LESS THAN 0.2
Projected Rainfall Increase Medium	Medium	Medium
No Present Risk	High Danger Zone	No Present Risk
Medium	Very High	Very High
Medium	High	High
Low	Low	Low
	MONTALBAN, RIZAL 648,495 MEDIUM Temp. Increase (C) 0.2 TO 0.5 Projected Rainfall Increase Medium No Present Risk Medium Medium Low	MONTALBAN, RIZALANTIPOLO648,495648,495MEDIUMMEDIUMTemp. Increase (C) 0.2 TO 0.50.2 TO 0.5Projected Rainfall Increase MediumMediumNo Present RiskHigh Danger ZoneMediumVery HighMediumHighMediumLow

LEGEND:

Winning site

Fig. 2. Site Selection

Figure 2 shows how proponent conducted three site comparisons based on secondary data in order to determine the applicable site for biophilic design. After comparison, the chosen site is Anawim Home for the Aged located in Montalban, Rizal.



Figure 3 shows the proponent listed as site criteria that would be applicable to biophilic design in a local setting. After the comparison, the site chosen for the study was Anawim Home for the Aged located in Montalban Rizal.





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iews of lature	Access to plants (inside and outside)	Vegetated roofs	Vertical farming	TOTAL
★	***			***
*	**			*
*	*			**

*	Highest	
ria		
Crit	eria	



Fig. 5. Existing Space Programming

Figures 4 and figure 5 shows the existing site development plan of the chosen site to show the relationship of each space.

### 4.2 **Design Implications:**

- Provide nature views of nature and gardens from patient's room, staff work space and other . rooms where stress is a problem
- Provide nature views with characteristics identified by research as effective in alleviating stress . and improving the outcome (i.e. park-like characteristics)
- Avoid deep floor plans with large portion of windowless rooms as these tend to worsen ٠ patient and staff outcome.
- Provide well designed outdoor gardens for patients, family, and staff. .
  - Convenient way finding the garden
  - Accessibility
  - Congruent nature sounds
  - Opportunities for physical activity, movement, and exercise.
- Recommended that visual art display in patient rooms and other healthcare spaces.
- Consider providing technology to enable patients to experience simulated nature. .
  - Can involve both visual simulations and sound, may tend to be more engrossing, more effective alleviating severe pain of the patient.

# 4.3 Features of the Plan Designed with Respect to the Principles of Universal Design

- a) an access to the building.
- b) which the building provides public spaces without eliminating the security of the individual.
- Simple and Intuitive Use Spatial organization and circulation of the building forms are C) straightforward and simple.
- d) ways on the walls will give "perceptible information" to the residents.
- e) ensure safety. Each building is separated from public, semi-private to private, in order to provide privacy for the residents.
- f) helps the inhabitants to use low physical exertion.
- g) the residents.





Fig. 6. Site Development Plan

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Equitable Use - the plan shows a residential environment that is accommodating to all types of users. Furthermore, for non-residents, such as individual's visiting their loved ones also have

Flexibility in Use – the project is outlined to react to various requirements of the individual, in

Perceptible Information – The atrium as the focal point of interaction helps the occupants to situate themselves in the building. In addition, signages, contrast in color, and recessed entry

Safety (related to tolerance for error) – Main entrance of the compound and buildings should

Low Physical Effort – Simple circulation lines with resting spaces in between circulation routes

Size and Space for Approach and Use – Calculations of each space are suitably arranged for



Fig. 7. Aerial View of the Site Plan



Fig. 8. Perspective View of Site Plan

Figure 6 is the new site development plan, the proponent based the landscape planning on the redefined biophilic design and design implications listed above. Also, features of the plan designed are with respect to the principles of universal design.

### 5. CONCLUSION

Biophilic approach is a design that creates a balanced environment between its occupants and the environment. In the application of the created criteria based on the principle and theory will further give architects, students and planners alike the distinct process of the growing relation as the design oversees the mutual benefits for both as well as imparting a cultural stature and relationship of man and nature itself.

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# The Effect of Hearing Stimuli on Human Thermal Sensation - Targeting environment sound -

### ABSTRACT

In recent years, there have been several devastations caused by the global climate change. Global climate change is considered as relating to the global warming and is becoming a serious problem. Global warming is related to the increase of carbon dioxide. The increase of the carbon dioxide is caused by the energy consumption increase. In addition, air conditioning dominates the large ratio of the energy consumption. Furthermore, according to the huge earthquake happened on March 11, 2011 in Japan, country's energy policy is facing a turning point, which is to establish less harmful and less energy based society than ever.

For that reason, to decrease the energy consumption, how to reduce the energy consumption by the air-conditioning is the important issue. There are several researches relating to the topic.

However, those researches did not study on the effect of the environment sound on the human thermal sensation. For that reason, the purpose of this research is to clarify the effect of environment sound on human thermal sensation.

Keywords: Global Warming, Environment Sound, Thermal Sensation

### 1. INTRODUCTION

Climate change is getting more and more serious issue in the world. The change is known as caused by increase of GW gasses, such as carbon dioxide which is the largest exhaust by human activity relating to the energy consumption in the world. In addition, the energy usage of buildings shows the largest ratio in the consumption.

According to the fact that most of energy consumption is caused by the buildings equipment, it is important to reconsider the equipment.

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Focusing on the building equipment, air conditioning shows the large ratio. For that reason, it is important to reduce the energy consumption by air conditioning system.

To reduce the energy consumption, there are many researches targeted the effect of water surface, , hue-heat, and floor cooling system as followings. There is a research targeted the effect of irrigation pond on surrounding thermal environment by long term outdoor measurement of thermal environment. This research grasped the effect of irrigation pond to lower the surrounding temperature, about 0.5 degree centigrade as the maximum. [Fukagawa et al., 2005]

In addition, the research targeted hue-heart was carried out by experiments and clarified that the effect of visual stimulus causes 0.3 degree centigrade difference. [Matsubara et al., 2004] Furthermore, to clarify the effect of artificial and non-artificial factors as visual stimulus on human thermal sensation are experimented. [Kurazumi et al., 2011]

There are also the researches on the composite environment of thermal and hue-heat impression in the several room temperatures. These researches grasped the interaction of the subject. [Hishida et al., 1985] [Ohno et al., 1987]

Fukagawa et al. showed that the effect of water on the temperature is smaller than how the human feels and detects. In addition, the result of Matsubara et al. showed that the human's thermal sensation can be affected by the visual stimulus, such as color. Furthermore, Kurazumi et al. clarified the difference of the effect by artificial and non-artificial visual stimulus on human's neutral temperature.

Hishida et al. and Ohno et al. grasped the interaction of the composite environment. According to the results, there might be some possibilities that the effect of water landscape can be not only as physical effect on surrounding temperature but also as the effect on human's thermal sensation. For that reason, the purpose of this research is to clarify the effect of sound on human thermal sensation.

### 2. EXPERIMENT OVERVIEW

This research is studied by a subject experiment. The experiment was carried out in the artificial weather chamber in Kyushu Sangyo University in Japan, in summer in 2014. For the experiment 6 male students were selected as subject. They were age of 20 and 21, and were asked to wear prepared unified clothes, which are short sleeve T-shirt and short pants made of 100% cotton. During the experiment, subjects were asked to sit on a chair calmly and asked to fill in the declaration vote after environment sound was played. The photos of the experiment are shown in Figure 1.

This experiment targeted slightly uncomfortable thermal condition. For that reason, temperatures set for the experiment were 28 and 30 degree centigrade. The moisture was controlled to be between 50 to 60%. 7 environment sounds are played during the experiment and its sound level



Fig.1. Photos of the experiment



Fig. 2. Average Score of Image Evaluation at 30 degree centigrade

The Effect of Hearing Stimuli on Human Thermal Sensation - Targeting environment sound -

Fig. 3. Average Score of Image Evaluation at 28 degree centigrade

The results of the evaluations are averaged in each temperature setting and the sound type, such as water-related and non- water related sound, are shown in Figure 2 and 3.

Looking at Fig. 2 which is the result of 30 degree centigrade setting, it is obvious that the water- related environment sounds marked higher than the other non-related sounds. In addition, the items which are "Fresh - Dry" and "Cool - Hot" showed big differences.

Looking at Fig.3 which is the result of 28 degree centigrade setting, there is not obvious tendency as 30 degree setting. However, the items which are "Fresh - Dry" and "Cool - Hot" showed little bigger differences than the other items.

### **3. ANALYSIS OF EVALUATION STRUCTURE**

To analyse the evaluation structure of the subjects, factor analysis was taken. "Bartlet method" was utilized for the analysis. For this analysis, the results of all the environment sounds were combined and analyzed. The result of the analysis, the factor loading matrix, is shown in Table 3. First, the analysis was done by setting the eigenvalue as more than 1.0 and obtained 5 factors which could not clearly identified. When the factor number is set as 3, clearly identified factors were obtained.

The first factor is named as "Emotion" because the items such as "Pure", "Comfortable" and "Crisp" which are relating to human emotion.

The second factor is named as "Movement" because the items, such as "Fast", "Energetic" and "Active" are categorized.

The third factor is named as "Space" because the items such as "Open" "Coexistence", and "Noble" are categorized.

Table 3. Result of Factor Analysis

Factor	1st Factor	2nd Factor	3rd Factor
Adjective	Emotion	Movement	Space
Pure	0.881	-0.172	0.214
Comfortable	0.873	-0.136	0.239
Crisp	0.857	-0.110	0.174
Beautiful	0.854	-0.114	0.212
Gentle	0.839	-0.261	0.047
Likable	0.816	-0.071	0.268
Necessary	0.744	0.080	0.141
Attractive	0.742	-0.037	0.299
Cool	0.740	0.165	0.076
Calm	0.728	-0.436	0.174
Bright	0.705	-0.028	0.116
Fresh	0.675	0.014	0.199
Quiet	0.670	-0.569	-0.100
Healthy	0.670	0.086	0.525
Masculine	-0.665	0.130	0.094
Rich	0.661	0.097	0.356
Enjoyable	0.588	0.265	0.169
Airy	0.563	0.236	0.059
Familiar	0.533	-0.090	0.457
Natural	0.524	0.281	0.374
Near	0.155	0.078	0.018
Fast	0.017	0.684	-0.357
Energetic	-0.353	0.671	0.171
Big	-0.200	0.665	0.064
Active	0.125	0.582	0.134
New	0.184	0.282	0.009
Open	0.460	0.090	0.671
Coexistensive	0.326	-0.175	0.624
Noble	0.392	0.372	0.539
Changeable	-0.108	0.091	0.488

Paper title





4. ANALYSIS OF AVERAGE FACTOR SCORE

The point diagrams of average factor score in each environment sound differed in each temperature setting are shown in Figure 4 and 5.

Looking at Fig. 4 which is 30 degree centigrade setting, by focusing on the 1st factor, 4 of the 5 water related sounds marked positive score. Non water related sounds, on the other hand, marked negative score. Beside the 1st factor, on the 2nd and the 3rd factor, there was no clear tendency.

Looking at Fig. 5 which is 28 degree centigrade setting, by focusing on the 1st, all the water related sounds showed the positive score. However, no sound also showed the positive score, which is close to water fall sound. Furthermore, the 2nd factor and the 3rd factor did not show the obvious tendency as the 1st factor.

		1st Factor Emotion	2nd Factor Movement	0
	Correlation Coefficient	397**	315**	
Thermal Sensation	Significance Probability	.000	.001	
	Number	108	108	ľ

\*\* shows the 1% significance coefficient of correlation

By the analysis of the average factor score in each sound, some tendencies are confirmed on the 1st and the 2nd factor.

# 5. ANAYSIS ON THE CORRELATION OF THE FACTORS AND THERMAL SENSATION VOTE

To analyse the correlation among the 3 factors and thermal sensation vote, Pearson's correlation analysis was taken. The result is shown in Table 4. Focusing on thermal sensation vote, "Emotion" and "Movement" showed significance coefficient of correlation of 1%. In addition, "Emotion" showed the bigger value than "Movement". According to the results of the previous chapters, it is possible to say that the essences which are evaluated as "Emotion" by the subjects affect the thermal sensation of the humans. Furthermore, the effect appears both in summer and winter.



Table 4. Correlation of the Factors and Thermal Sensation Vote

### 6. DEFINITE FACTOR ANALYSIS ON THERMAL SENSATION VOTE

To analyze the definite factor on thermal sensation vote, multiple linear regression analysis was taken. For this analysis, 2 factors, which showed the 1% significance coefficient of correlation by the Pearson's correlation analysis, were utilized.

The score of the thermal sensation was set as dependent variable. The scores of the 2 factors were set as independent variables. The result of multiple linear regression analysis is shown in Figure 6.

The multiple correlation coefficients by the analysis showed 0.498 which can be taken as high reliability by considering the fact that the thermal sensation is in step scale.

The both of the 2 factors showed negative correlation to the thermal sensation. This means when the factor score increases, the subjects feel that the thermal condition is cooler.

### 7. CONCLUSION

By this research, it can be said that the environment sounds which mark high score in the 1st factor affect the thermal sensation more than the other sounds. In addition, the 3rd factor does not clearly affect the thermal sensation.

The obtained 4 results are as followings.

- By the factor analysis 3 factors were obtained from the environment sounds. 1.
- 2. 2 of the 3 factors showed negative affect with the significant coefficient correlation on the thermal sensation and the 1st factor showed the largest ratio. This tendency is more obvious under 30 degree centigrade setting than 28.
- 3. Among all the environment sounds, "Rain" "Stream" "Water Bamboo" marked the large score on the 1st factor
- The sounds mentioned above have possibility to lower the human thermal sensation and 4. increase the thermal comfort. However, the tendency is more obvious at 30 degree centigrade which means that the sound is more effective on the slightly hot thermal condition.

### ACKNOWLEDGEMENT

I would like to show my gratitude to who joined the experiment as the subjects for their supports.

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Interactions Between Thermal Sensation And Hue-Heat Impression Under Various Thermal

# Using landscape art as a medium for managing sustainable rural landscapes and local development: a case study of a landscape art project in Yilan, Taiwan

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### ABSTRACT

Landscape is dynamic, so is the profession of landscape architecture. The physical design, planning and engineering approaches are familiar to the landscape architecture profession. However, new approaches and tools of intervening in the landscape need to be constantly explored in order to deal with the landscape that is highly dynamic.

Today, tourism provides capital investment for the improvement of physical landscape facilities which is welcomed in many rural areas. However, the seemingly prosperous development could result in an alienated landscape, de-located and uprooted from its local contexts and on the way to becoming unsustainable. The landscape art project in a coastal rural area of Yilan, Taiwan in 2016, has responded to this problem, by taking approaches to intervention that are different from the physical design and planning approaches. Through re-exploration of the landscape character, encouraging creativities and new imagination of the territorial resources, the project aimed to promote enrooted local development and sustainable local landscape.

The idea of landscape art in this project is not about art objects independently created by artists and installed upon a landscape to be looked at. The landscape art in this project is the embodiment of the interactions, relations, and performance of people, place and time. In this sense, the artworks, activities, local residents and the artists are not detached subjects of the landscape, rather, they were part of that landscape in time. The notions of landscape dynamism combining physical, perceptual, relational, temporal and somatic engagement were well manifested through the art activities of this project. The project showed that a new understanding of landscape dynamism and enrooting could open up new approaches for the landscape architecture profession and a new meaning of landscape intervention for the sustainable management of landscape.

**Keywords:** Landscape art, Landscape intervention, Landscape character, Rural development, Enrooting

### **1.INTRODUCTION**

Landscape and the notions of landscape are both dynamic (Wang, 2015), so is the profession of landscape architecture. Our understanding of landscape will determine our ways of intervening in the landscape. Constant examination and re-examination of the notions of landscape in relation to the actions and interventions in the landscape is crucial for the vitality of the landscape architecture profession.

The notion of landscape, as the Oxford English Dictionary (Burchfield, 1976, p.480) puts it, means 'a tract of land with its distinguishing characteristics and features, especially considered as a product of modifying or shaping processes and agents'. Such a notion stresses the physical outcome and representation of the interactions between cultural and natural forces (Wang and Chou, 2016). Landscape is understood as an external pre-given reality observed and represented from a detached position by an independent perceiving human subject (Wylie, 2007).

Different understandings of landscapes were developed along with their material and physical aspects; these include the perceptive and symbolic approaches, which imply that landscape does not exist merely as objective facts, but takes shape out of human perception and imagination (Wang, 2015). The European Landscape Convention defined landscape as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors' (Council of Europe, 2000, p.3), which recognizes the significance of both the objective and subjective qualities of landscape. Landscape, from this notion, includes how we look and understood, not just about what is there and what we see. The physical representation of landscape was extended to, and complemented by, representations of the symbolic qualities in text and visual images with cultural meanings (Wylie 2007).

While the physical and symbolic notions stress the visual and the already-made representations of landscape; nonetheless, the performative notions emphasize landscape as ever-changing rather than as a fixed image existing in a completed state (Oakes and Price, 2008). Landscape is, from this notion, not so much an entity in itself but the assembled outcome of networks and embodied relations (Wang and Chou, 2016).

Different notions of landscape lead to different approaches and actions within the landscape architecture profession. Rooted in the materiality, objectivity, and expertise in the production of landscape, the rational-comprehensive planning approach, characterized by rational analysis and physical planning, has been very influential in the structuring of the landscape planning discourse and practices (Wang and Chou, 2016). The physical design, planning, and engineering approaches are familiar to the teaching and practice of the landscape architecture profession, however, new approaches and tools for intervention into the landscape need to be constantly explored in order to deal with a landscape that is highly dynamic.

Taking a case study approach of a landscape art project in 2016 in Juangwei, Yilan County, Taiwan, the study focused on the idea of landscape and landscape art, the meaning of the art activities to the participants, and the influence of the project. Based upon interviews with the project organizers, county officials, participants, and the analysis of documents, the study examined the notions of landscape through art activities and exploring new approaches of landscape intervention for the landscape architecture profession.

### 2.THE LANDSCAPE ART PROJECT AND THE PROJECT AREA

### 2.1 The Project Area Of Juangwei, Yilan

Juangwei is a township in Yilan County located on the northeastern coast of Taiwan facing the Pacific Ocean. Like many rural areas of the present day, agriculture used to be the major development in Juangwei but now it cannot sufficiently support the local economy and jobs. The local identity becomes vague despite that it has the characteristic landscape of the Pacific coast, the sand dunes and the Turtle Island off the shore which were transformed into the local myth of the Giant Turtle (Turtle Island) and the Serpent (the sand dune) that protected Yilan. The rich local cultural heritage of the Kavalan tribe and the settlement history are gradually fading away due to the influences of socioeconomic change and urbanization. However, these backgrounds have become the reason that this area was chosen for the landscape art project (Fig.1). The project organizer describes the character of the landscape of this area (Wang, 2017):

"It's messy, not a postcard kind of picture-perfect coastal landscape. It's wild, in which nature constantly demonstrates its devastating strength and beauty. In time, the people, plants, and birds were all doing their best to find their niche to live in this extreme territory. It's uniquely located, where the largest continent meets the largest ocean, and on the very eastern edge of the Eurasian Continent facing to the great Pacific Ocean. It has rich local stories that are being gradually forgotten, as if this place and the stories never have existed."



Fig.1. Images of the project area.

Through arts and creativity, as the main idea of organizing the project, the character and beauty of this place could be explored and expressed; the spirit and potential of the landscape could be reexamined and highlighted, and they could all become valuable territorial resources for the sustainable development of this coastal rural area.

### 2.2 The Landscape Art Project

The landscape art project was held in Juangwei in 2016, entitled "2016 Yilan Festival of Land, Arts and Creativity". The aim was through promoting creative activities and local participation, to build a linkage between people and landscape; to explore landscape character and bring in fresh imaginations to the locality. It was hoped that "art" (instead of capital) could be a driving force and a tool of landscape management aiming for sustainable local development in Juangwei.

The main activities of the project were held between February and June of 2016, and included: Invited artists and participatory workshops (five invited artists from Yilan, Taipei, Japan, and the a.

- UK).
- b. selected and installed).
- A short film competition (six winning projects were selected). C.
- Community and student participation and workshops (three communities, four of the local d. elementary schools and high schools participated).
- Global exchanges (Contacts and exchanges with a Japanese and a French landscape art e. festival).
- f Guided tours and the sharing of the project with the people (34 guided tours were held).

### 3.DISCUSSION

## 3.1 The Representation And The Represented: The Idea Of Landscape Manifested Through Art

The art activities of this project started from activities for the "representation and expression" of the landscape. The participants engaged in activities for representing their feelings about, and understanding of, the landscape and also as an expression of their "being in the landscape". However, during the process, the place, climate, activities, conversation, artists, local residents all together accomplished and created the artwork. The artworks and landscape are neither independent, detached subjects nor the representation and the represented, rather, the artworks were part of the landscape in time; the representation and the represented could not be separated (Wang, 2017).

One artwork was entitled "Landscape is theater". Understanding that the growing, harvesting and the working to separate peanuts from the shells are common local household activities, the artist engaged and involved these activities into his concept of art, and turned the bags of peanut shells into a "sofa and lobby" placed on the beach, facing the Pacific and the Turtle Island (Fig.2).

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A landscape art competition for ideas and proposals (about 120 proposals, ten of them were

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Fig. 2. The artwork "Landscape is theater"

As the artist described: "The idea is not to create some added piece of artwork in the outdoors to be looked at. We must appreciate that landscape is a theater. Growing, harvesting the peanuts, putting the peanut shells bag sofa on the beach, and people come to sit, talk, fish, work, play, think, looking at the ocean. All together it's the "landscape". The artwork is part of the landscape & it is the activities that completed the artwork!"

Another artwork was entitled "Things do not last". The artist invited people (local residents, visitors, students, etc.) to build sand cubes on the beach with the artist. One-by-one the sand cubes were built and, at the same time they broke and were eroded by the wind, the rain, the curious visitors, and gradually fell down onto the sand beach from which they had been made(Fig.3). Watching the sand cubes being built and guickly collapsing, the villagers and local residents suggested to the artist to add some cement so that the sand cubes could be more durable. The artist responded:

### "Yes, it will break, that's fine!"

According to the project organizer, it was most challenging to interpret this artwork to the public, but it was most fascinating and the best manifestation for the understanding of the dynamic nature of landscape. As mentioned by Wang (2017), just like the building and collapsing of the sand cubes, landscape changes but the process continues. During the creation of this artwork, people made something knowing that it would not last, and yet they still continued doing it. The fact that the sand cubes quickly collapsed was seen by many people as an imperfection, but this imperfection characterized the fascinating, dynamic, and ever-changing nature of landscape, which was highlighted through the creation of artworks (Wang, 2017).



Sharing the sense of landscape as forever in the making and becoming, the "things do not last" artwork is the best example of the manifestation of the performative notion of landscape.

## 3.2 Reassurance Of A Positive Sense Of Being In The Landscape: The Meaning Of Participating In The Landscape Art Activities

For many local residents, hardships characterize living in Juangwei. The geographical conditions of this area include earthquakes, constant flooding, being on the front line to the impact of typhoons in summer and strong north-eastern monsoon winds in winter, used to create sadness in the residents about being in this place. The remoteness (from the urban perspective) has made creating jobs in this area difficult. For the local residents, their confidence about living here was low, and the understanding of the value and character of the landscape weak.

In this situation, the landscape art activities helped local people to see the interesting, characteristic, and beautiful side of this landscape. From which they regained confidence about being in the landscape and the value of living there. The landscape art project, according to one participant. "gave opportunities to understand, and re-understand the landscape, and to create things together to express this, and regain the meaning of living here".

One artwork created by the artist working with villagers was entitled "the gate and gaze of the Pacific Ocean". The fact that the village sits at the very eastern edge of the Eurasian continent facing the great Pacific Ocean was raised, experienced, and gained appreciation through the conversation of the local villagers and the artist from the UK. As a result, a pair of pyramid-shaped structures made by the artist and the villagers from driftwood on the beach were created and installed on the edge where the little village path meets the ocean beach. It was an expression by the villagers of their appreciation of "being here" at the very location where the village was situated (Fig.4).

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Fig. 3. The artwork "Things do not last"

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Fig. 4. The artwork "The gaze and gate of the Pacific Ocean"

### 3.3 Rediscover The Local Value And Imagination: The Influence Of The Landscape Art Project

The challenges of sustainable rural development in contemporary society were characterized by the fact that non-agricultural functions (housing, manufacturing, services, recreation, etc.) can be found in both urban and rural areas (Elbersen, 2002). As the boundary and definition between rural and nonrural become fuzzy, multiple social and functional spaces share in those rural areas that were previously dominated by agriculture (Cloke, 1997). Moreover, the presently prevailing socioeconomic idea of "division", in order to increase efficiency, to maximize production, to remove environmental variables, and to minimize cost and price often resulted in a detachment between development and its local contexts; and also resulted in the separation between activities and the integrated experience of 'being in the landscape' (Wang, 2015). The geographic traits of an area, including its resources and limits, are no longer the dominant conditions for the development of a local area. The production, consumption, and developments could be efficient but "de-located", which means these activities could have no indication or relation to where they were located. In the contexts of globalization and division, as local development is now free from the local conditions (constraints as well as characteristics), the regional distinctiveness is disappearing.

In such an overwhelming contemporary socio-economic situation, the landscape art project attempted to re-connect the missing link between people, landscape character, and the local development. According to a local participant, the landscape art activities helped to find: "... new imagination for the possibility of local development which is not, as previously understood, limited only to housing, hotels, and restaurants. And that the value of local territorial resources was fundamental for sustainable local development".

As rural areas have become an arena of multifunctionality and urbanization, many rural landscapes are developed for housing, leisure purposes, and as tourist attractions in order to serve the needs of the urban population for their rural fantasy. Thus, the rural landscape has become detached from its local individuality and sustainability. The key for sustainable rural development could be enrooted in the territorial resources and identities, instead of aiming for division and standardization.

### **4.CONCLUSION**

Today, tourism provides capital investment for the improvement of physical landscape facilities which is welcomed in many rural areas as a promising sign of rural development. However, the seemingly prosperous development could result in an alienated landscape, de-located and uprooted from its local contexts and on the way to becoming unsustainable. The landscape art project has responded to this problem, by taking approaches to intervention that are different from the physical design and planning approaches which are familiar to the landscape architecture profession.

The project used landscape art as a medium, through the art activities of re-exploration and expression of the landscape character of Juangwei, the participants built up a new understanding, appreciation and imagination of the local landscape. The value and importance of enrooting territorial resource for sustainable local development became better recognized by the local residents and the county officials.

As Wang (2017) stressed, the idea of landscape art in this project is not about art objects independently created by artists and installed upon a landscape to be looked at. Instead, the landscape art in this project is the embodiment of the interactions, relations, and performance of people, place, and time. During the project, the territorial elements, climate, activities, artists, local participants all together created the artworks. In this sense, the artworks, activities, local residents, and the artists are not detached subjects in the landscape; rather, they were part of that landscape in time. The notions of landscape dynamism combining physical, perceptual, relational, temporal, and somatic engagement were well manifested through the art activities.

The project showed that a new understanding of landscape dynamism and enrooting could open up new approaches for the landscape profession and a new meaning of landscape intervention for the sustainable management of landscape.

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# Reflective Ideas in Environmental Art from the 1960s onward on the Contemporary Landscape Architecture

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### ABSTRACT

Since the 1960s, the evolution of the environmental art, a unique form of art seeking to redefine the connection between the human and nature, was the front line of debates among landscape architects. Correlations between environmental art and several eminent landscape architects such as Peter Walker, Kathryn Gustafson and George Hargreaves, were reviewed by a large amount of literature (for example, Weilacher, 1996; Beardsley, 1998, 2000; Balmori, 2010, 2011, etc.). It has been nearly six decades since the first emergence. Although today environmental art may not be as vibrant as its heydays, their contemporary transformation covering vast scopes, approaches and issues still stands out as exceptional and noteworthy examples that reflect the ways of thinking about ourselves and of being in the world. With constant new developments in landscape architecture, such knowledge of the past can help to set aims for the future. The study's objectives are to identify and summarize overall significant ideas underlying in environmental art that the future development of landscape architecture should be notified or perhaps be aware. However, Although the research's fieldwork, which includes semi-structured interviews and focus group, are based in the United Kingdom, the investigation of the research covers practices of landscape architecture and environmental art in various contexts, including Europe and North America.

Keywords: Reflective Ideas, Environmental Art, Contemporary Landscape Architecture

### 1. Background and Objective

Historically, landscape has always been a theme of art. In the fourteenth century, landscape sceneries were typically captured in paintings, drawings and prints. In the eighteenth century, illustrations of landscapes served to describe the feelings of the Beautiful, Sublime and Picturesque in paintings. In the 1960s, the theme of landscape in art took a radical turn. Rather than simply placing the artworks on or in landscapes as in traditional paintings or sculptures, landscape became a means of art seeking to redefine the connection between the human and the natural world. Environmental art was formulated into unique forms, integrating with landscapes using natural materials. Some of the iconic environmental artworks are as illustrated in Figures 1-3. Landscape architecture, on the other hand, was first officially established in 1858, yet its historical development may be traced as far as the early human civilisation [6].

Pattamon Selanon

Throughout its long history, landscape architecture has devoted to understanding and shaping the land. In the second half of the twentieth century, several eminent landscape architects began to reconfigure the land in the manner of environmental art. For example, George Hargreaves' Candlestick Point Cultural Park (1993) (Figures 4-5), in San Francisco, California, Michael Van Valkenburg's Mill Race Park (1989-93) in Indiana (Figures 6-7), and Peter Walker's the Tanner fountain (1984) (Figure 8). The correlations of the forms, styles and underlying thoughts of these artworks and landscape architectural projects implied a strong connection between landscape architecture and environmental art, the young sub-discipline; yet, its underlying thoughts lie within the realm of visual art, which is eventually noticeable. 'History cannot give us a program for the future, but it can give us a fuller understanding of ourselves, so that we can better face the future' [16]. By exploring the pastto-current associations between the two disciplines, this research aims to identify and summarize relevance of environmental art to landscape architecture in terms of ideas, it is hoped that the study will assist in guiding means for decisive contributions to future landscape architecture.



Fig. 1: Robert Morris's Observatory (1971)



Fig. 2 - 3: James Turrell's Roden Crater (1977)

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Fig. 4-5: George Hargreaves' Candlestick Point Cultural Park (1993)





Fig. 8: Peter Walker's the Tanner fountain (1984)

### 2. Methodology

In this research, the two data collection methods were semi-structured interviews and focus groups of 25 specialists from academia and practitioners from the disciplines of environmental art and landscape architecture. Subsequently, thematic analysis and triangulation with literature are applied to achieve the study objective.

### 3. Findings and Discussions

The timeline illustrated in Figure 9 lists some examples of works by both disciplines, which were discussed among specialists of the research. Dominant events interlinked with the two disciplines present in this research were also presented.

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Fig. 6 -7: Michael Van Valkenburgh's Mill Race Park (1989-93)







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## SELECTED DOMINANT EVENTS

- 1. The fifteenth French Landscape
- 2. Paintings by Claude Lorrain and Nicholas Poussin (around the mid 17th c.)
- 3. The conception of genius loci (Egyptian period)
- 4. The eighteenth English Landscape
- 5. Modern Movement (around the late 19th c.) 5.1 Modern Art (around the late 19th c.)
- 5.2 Minimalism, Conceptualism, and Process Art (around the beginning of 1960s)
- 5.3 Architecture Modernism (around the late 19th c.)
- 4. Christopher Tuppard's Garden in the Modern Landscape (1938) 5.5 Landscape as Art (around the mid 20th c.)
- 5.5 Landscape Modernism (around the mid 20th c.) 6. Postmodernism (around the mid 1950s)
- 6.1 Postmodern Art (around the mid 1950s) 6.2 Rosalind Krauss's Sculpture in the Expanded Field (1979) 6.3 Architecture Postmodernism (around the mid 1950s) 6.4 Charles Jencks' The Language of Post-modern Architecture (1977)
- 6.5 Landscape Postmodernism (around 1960s) 7. Environmentalism
- 7.1 George Perkin March's Man and Nature(1864) 7.2 First Environmentalism (around the mid 19th c.) 7.3 Rachel Carlson's Silent Spring (1962)
- 7.4 Modern environmentalism (around the mid 1960s)
- 7.5The Blue Marble taken by Apollo 17 (1972)
- 8. Ian McHarg's Design with Nature (1969)
- 9. Establishment of landscape architecture discipline (1858)

### SELECTED ENVIRONMENTAL ARTS

- 1. Richard Long's A Line Made by Walking (1967)
- 2. Michael Heizer's Isolated Mass/ Circumflex (1968)
- 3. Robert Smithson's Spiral Jetty (1970)
- 4. Robert Morris's Observatory (1971)
- 5. Harrison and Harrison's Survival Piece (1971) 6. Christo and Jeanne-Claude's Running Fence (1976)
- 7. James Turrell's Roden Crater (1977)
- 8. Walter De Maria's Lightning Field (1977)
- 9. Carl Andre's Stone Field (1977)
- 10. Alan Sonfist's Time Landscape (1978)
- 11. Dani Karavan's Axe Majeur (1980) 12. Richard Serra's Tilted Arc (1981)
- 13. James Pierce's Pratt Farm (1982) 14. Mel Chin's Revival Field (1993)
- 15. Tim Collins and Reiko Goto-Collins's Nine Mile Run (1997)
- 16. Joseph Beuys's 7000 Oaks (1987)
- 17. Andy Goldsworthy's Ice Pieces (1987)
- 18. D.A.ST's Desert Breath (1997)
- 19. Trudi Entwistle's Fold (2003)
- 20. Trudi Entwistle's Eel Retreat (2008)
- 21. Chris Drury's Waves and time (2011)

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### SELECTED LANDSCAPE ARCHTECTURAL PROJECTS

- 1. Central Park, New York (1857)
- 2. Frederick Law Olmsted's Back Bay Fens (1887)
- 3. Martha Schwartz's Bagel Garden (1979)
- 4. Sasaki and Associates's Frito Lay (1985)
- 5. Martha Schwartz's Splice Garden (1986)
- 6. Bernard Jschumi's Parc de la Villette (1987)
- 7. Peter Latz's Duisburg-Nord (1991)
- 8. Martha Schwartz's Jacob Javits Plaza (1992)
- 9. Peter Walker's Toyota Municipal Museum of Art (1995)
- 10. Diana Balmori's Prairie Waterway Stormwater Park (1996) 11. Diana Balmori's The Garden That Climbs The Stairs (2009)
- 12. AECOM's Queen Elizabeth Olympic Park (2012)

### SELECTED ENVIRONMENTAL ARTS AND LANDSCAPE ARCHITECTURAL PROJECTS, WHICH HAVE BLURRED DISCIPLINARY BOUNDARIES (Line and Texts Highlighted in Blue)

- : ENVIRONMENTAL ARTWORKS
- 1. Patricia Johnson's Fair Park Lagoon (1981)
- 2. Herbert Meyer's Mill Creek Canyon (1982)
- 3. Nancy Holt's Dark Star Park (1984)
- 4. Robert Irwin's the Central Garden (1997)
- 5. Peter Fink and Igor Marko's Northolg Field (2008)
- : LANDSCAPE ARCHITECTURAL PROJECTS
- 1. Maya Lin's Vietnam Veterans' Memorial (1982)
- 2. Peter Walker's the Tanner fountain (1984)
- 3. Charles Jencks' Garden of Cosmic Speculation (1988)
- 4. George Hargreaves's Guadalupe River Park (1990)
- 5. George Hargreaves's Byobee Park (1991)
- 6. George Hargreaves's Crissy Field (2001)
- 7. Kim Wilkie's Boughton House (2009)
- 8. Grossmax's Theater der Pflanzen (2010)
- 9. Charles Jenck's Northumberlandia (2012)

The following discussion draws together the analytical dimensions of the research's findings to return to the research objective.

### 3.1 Relevance of Environmental Art to Landscape Architecture in terms of Thoughts and Ideas

The study identified that there are no particular rules or general agreement within environmental art in terms of the approach to exploring landscapes. Within the realm of theory and philosophy applying in art discipline, the environmental art artists uniquely developed a series of different creative approaches and diverse ideas, all of which attempted to explore new strategies for art creation. Nonetheless, four important ideas, comprising the concept of the spirit of the site, the three eighteenth-century aesthetic appreciations, the passage of time and environmentalism, are highlighted in creation of environmental art and can be described as theoretical connections between the two disciplines. In addition, findings of the research suggest that the sub-discipline of environmental art has underscored four overarching existing ideas of landscape architecture as followings.

### 1) The Concept of the Spirit of Place

The study identified that much contemporary landscape design focuses on other aspects such as strong artistic expression or the Modernist approach, leading landscape architecture to receive criticism as not being well blended with the site, causing the place to be placeless. The study indicated many factors contributing to this loss, such as budget constraints, limitation of land area, etc. Among all these factors, prioritising the significance of scientific site information must be included. Making potentially contestable decisions in landscape design often relies heavily on the scientific information gathered. Landscape practitioners have correspondingly become less concerned with the non-tangible elements of the site.

The study highlighted that the concept placed at the core of environmental art was the proper placement of the artwork on the site to best enhance with the spirit of place or genius loci. The concept was firstly inserted as a founding principle of landscape design by the British poet Alexander Pope in the eighteenth century [11]. Christian Norberg-Schulz (1980) wrote,

Architecture means to visualize the genius loci, and the task of the architect is to create meaningful places ... [where] he can orientate himself within and identify himself with an environment (Motloch, 2001, p.57).

Though the findings of the research indicated that many artworks, particularly those with a strong artistic expression, may not be harmonious with their sites, the majority are well enhanced with the genius loci. The aspect of how environmental artists enhance the site may have helped restoring landscape architecture's old and lost concern for the intricacies of site and rekindled concept of the genius loci in landscape design. The study thus proposes reinforcing the centrality of the spirit of place in the principle of landscape design.

Designing landscapes should be rooted in a clear understanding of local tradition. Landscape practitioners should always be concerned with highlighting issues that relate directly to the creation of a sense of place and sensitivity to local distinctiveness. A clear priority must be to ensure that the solutions chosen enhance and reinforce local distinctiveness, just as in Pope's Epistle IV (1751):

Consult the genius of the place in all; That tells the waters or to rise, or fall: Or helps th' ambitious hill the heav'ns to scale, Or scoops in circling theatres the vale; Calls in the country, catches opening glades, Joins willing woods, and varies shades from shades, Now breaks, or now directs, th' intending lines; Paints as you plant, and, as you work, designs. (p.273)

### 2) Creativity and Experimental Minds

Currently, even though landscape architectural design is better perceived, evidence set out in this study confirmed that the criticism of landscape design as lacking compelling ideas and expressive forms still remains. A research specialist, noted in his interview,

'The communication of ideas in some landscape designs was not there to allow people to actually recognise'.

The investigation has shown that the attempt to provoke ideas may not have sat well with the conservative base values of the discipline. Landscape design fails to express conceptual concerns. According to the research, there are two main factors. One is that landscape architecture is bound to be responsive to functionality and programmes. The other is the nature of the discipline as involving stewardship.

Creativity and experimental minds are essential gualities for artists in all fields of art. including environmental art. Although art in the manner of the 1960s creates no surprise in today's context, its sense of creativity and experiment remains relevant. The study also reveals that when the two professions have worked across boundaries, the avant-garde environmental art has been chosen. The artists took over the positions of landscape architects. Beardsley (1998) discussed the case of Irwin's artworks (1997) at the Getty Center in Los Angeles:

In hiring an artist rather than a landscape architect, the Getty Center made an adventurous choice that most supposedly innovative places are not willing to make (p.185).

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Although this has made the professional boundaries become more blurred, works of environmental art may also have ignited the innovative and experimental spirit of landscape architecture. Even though landscape design creativity is not possible without considering functionality and science, persistence in formulating appropriate and inspiring design should always be encouraged at the landscape design base. The LI (2015) set as a future plan for 2011–2016: 'creativity and critical thinking to ensure that the profession remains vibrant, forward-looking, multidisciplinary and relevant'. This recommendation by the LI (2015) was supported by the research's specialist as the followings;

Landscape architecture is as expression of ideas through the materiality of the discipline .... And the work of landscape architecture is to express creative ideas to shape qualities of experiences .... And to be able to do it successfully, you need to be very culturally aware. And you have to understand what creative idea is current. You have to be able to push the boundary .... You have to translate the idea into something that's spatial and visual, and articulate why that idea is appropriate.

Moore's suggestion seems to be logical and practical. With this guideline, it could eventually lead the innovative creations of landscape architecture into the twenty-first century and onwards. With this guideline, it could eventually lead the innovative creations of landscape architecture into the twenty-first century and onwards.

### 3) The Intellectual Understanding of the Concept of Nature

There were two typologies of environmental art in the 1960s, providing suitable metaphors for the transformation of land. The first was in the manner of the art, which directly addressed social and environmental issues. It often presented in the reclamation and remediation of damaged environments, restoring ecosystems through a diversity of artistic and scientific methods. In recent years, through collaboration with scientists and multidisciplinary teams, the approach has moved forward, allowing the artists to work freely in the investigation of nature. The other tradition of environmental art of the 1960s was the manifestation of engagement with the natural world. The art proposed ways for humans to co-exist and share engagement with nature. This art appeared in the works and thinking of many other artists, particularly the avant-garde. Even having different agendas, both traditions of environmental art re-envision the complex concept of nature. Among all environmental artists, Robert Smithson was the one who most obviously transitioned to the new view of nature as being multifaceted and changing. In his interview in 1972, Smithson made a clear statement: 'We have to develop a different sense of nature; we have to develop a dialectic of nature that includes man' [5].

These two traditions of environmental art, which were enriched with educational components and an advocacy stance, were compatible with McHarg's ecological landscape design, which was arguably considered one of the greatest achievements of landscape architecture. Although its scientific technical applications are better known, McHarg clearly explored the concept of nature. His ideal was: Nature is process, that is interacting, that is responds to laws, representing values and opportunities for human use with certain limitations and even prohibitions [10].

In term of relationship between man and nature, McHarg remarked that: Man and nature should not be viewed as separate – that man is dependent upon nature for his own survival and well-being [9].

Many of the research participants argued about McHarg's concept. The research participant, shared in the interview:

I was educated in the school of landscape architecture at Newark, which taught me a very interesting but very specific way of looking at landscape. Very much landscape as a large scale planning, regional land use, and early days of GIS.

McHarg's scientific method of analysis and planning seem to be better acknowledged and well known than his philosophical underlying thinking. Evidence from the study demonstrates that framing a natural process as part of a design can be an excuse for landscape architects from making potentially contestable decisions, whilst the understanding of conceptual thinking of nature was missing and considered a 'serious weakness' of landscape architecture as referred to by a specialist in landscape architecture, in the interview.

Nature is multifaceted, changing over the centuries, depending on the form of influence by society and cultural norms. One overarching goal of landscape architecture is to create a harmonious relationship between human needs and the physical environment [12]. The attempt to pursue an understanding of the concept of nature is arguably considered as something nice to have rather than something essential. This is evident in the practices of landscape architecture over the past decades. Landscape architectural works can be produced without considering intellectual underpinnings of the concept of nature. Yet, to be able to achieve the ultimate goal in creating harmony between humans and nature, the study argues that the understanding of the concept of nature should be brought to people's attention and consistently examined. It is also an explicit design service in which the landscape designer is knowledgeable and claims to have expertise. The proposal of the research corresponds with the ideas illustrated by Murphy (2005):

As educated citizens and professionals, we need a guiding philosophy, if only to satisfy our curiosity about the world and our place in it and, equally importantly, to establish our role in society as architects of the landscape (p.225).

## 4) Harmony Between Artistic and Scientific Values

Drawing from the findings of the research, accentuating either artistic quality or scientific determinism was clearly disapproved. The environmental art that was based largely on artistic concerns received strong criticism for ruining the identity of place and the spirit of place. A research participant made a firm statement on this in the interview:

When aims of works are purely for visual reward, there's a great danger. ... It's very dangerous to prioritise the approach as an artistic device.

Landscape architecture is a combination of science and art. In his Design on the Land: Development of Landscape Architecture (1971), Norman Newton described landscape architecture as:

... the art – or the science if preferred – of arranging land, together with the spaces and objects upon it, for safe, efficient, healthful, pleasant human use (p.xxi).

Art and science have been merged in the landscape design vocabulary of the French Baroque gardens, the English Landscape gardens and in pure simplistic functional Modernism. The inherent paradoxical poles of art and science resurfaced during the 1960s with the advent of McHarq's ecological design and landscape design that was associated with environmental art. Landscape designers from both aspects intensively explored their core values and widely practised during approximately the same period.

The core values of McHarg's ecological design had a preference for science over aesthetics [2]. The findings of the study demonstrate that the combination of McHarg's ecological design and the principles of the English School of Landscape Design resulted in 'very boring' and 'really dull' landscapes. In addition to having negative effects on design, the emphasis on science seemed to accelerate the deep-rooted misconception of landscape architects as plant experts.

Neither a single artistic nor scientific approach can meet the needs of today's complex society. To achieve a desirable landscape design, the mastery of scientific matters will continue to be of growing importance in the work of landscape architects, but the elements of artistic vision and creative invention will also remain essential. Rather than seeking dominance on one side, landscape architecture needs to embrace both the scientific and artistic poles that supply it with ideas, and as a discipline it needs to hold the balance between these complementary principles. This study's proposal is consistent with a the concept of landscape design coined by Balmori (2010), who stated:

Landscape design should take issues of artistic form and programmes into design considerations. And it should continue supporting the long-term development of mutual interactions between humans and nature; however, they must be strikingly different from existing environments, signifying a new engagement with nature (p.xv).

### 4.2) Notifications from Environmental Art to Landscape Architecture

By assessing the issues raised in the study, a set of recommendations, which can be taken forward in both conceptual and implementation terms can be provided as followings.

Artistic form and expression should be taken into design consideration along with all other 1. aspects. It is preferable for landscape design to be subtle and harmonise with the context, signifying a new engagement, but the difference from the existing setting should also be apparent. However, it is also legitimate to have landscape design that is provocative and contrast with the context, but is still considered as a deliberate response to the context and still be appropriate. There should be a counterbalance between artistic forms and characteristics of place.

- 2. materials that were used locally historically. This knowledge should be used as a basis for of place in a rural, naturalistic place.
- 3. enrich design to be more than is conceive by the form.
- 4
- 5. value of landscape design.
- 6. tradition could be helpful in accelerating the development of landscape theory.
- 7. acquiring new knowledge and in translating it into design performance.
- 8. management, as one primary principle of landscape design.
- 9 development of landscape architecture.
- 10. the long term.

### 5. Concluding Statement

It has been more than fifty years since environmental art was linked with the discipline of landscape architecture. Looking back, it is a unique landscape history, when the artistic form and the dynamics of nature were well recognised. These landscape architectural works nevertheless stand out as exceptional and noteworthy examples that reflect the ways of thinking about ourselves and of being in the world. With constant new developments in landscape architecture, such knowledge of the past can help to set aims for the future. Even though environmental art today has different approaches from its first emergence in the 1960s, contemporary landscape architecture seems to remain affected by the art. Together in the future, both disciplines might finally help us to regain the harmony between land and human that has eluded us for so long.

Consultation with the genius loci should be retained. All designs should be rooted in a clear understanding of site setting. The identity of the site should be observed, plus the sorts of working up a design. What sits well in an urban or industrial setting may look obtrusive and out

Attention should be paid to the intellectual understanding of the concept of nature, and this should be consistently examined. It could not only provide guidance in shaping land, but could also

Landscape designers should be encouraged in critical thinking and having creative minds and experimental spirits, to ensure that land transformation is vibrant, forward-looking and relevant.

Landscape design should be articulated in terms of ideas rather than techniques so that people can understand the nature of the profession properly. This is not only to diminish the deep-rooted misperception of the profession as being one of technicians, it could enrich the

The tradition of criticism, particularly in the manner of art critique, should be encouraged in landscape architecture in order to evaluate, interpret and justify works of landscape architects. This

Landscape designers should always be well trained and skilled in the integrated process of

The passage of time should be considered beyond the design concept and landscape

The landscape architect should look beyond professional boundary lines and learn to become interdisciplinary. Collaboration with multidisciplinary teams should always be encouraged to provide an appropriate framework that meets the environmental and artistic challenges in the

Landscape architecture should be developed and evolved in guiet stimulation, which is persistent, yet in a humble way, so that development in landscape architecture can flourish in

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Reflective Ideas in Environmental Art from the 1960s onward on the Contemporary Landscape Architecture

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### INTRODUCTION

The realm of landscape design is both diverse and distinct. There are two parallel discourses that float around in landscape theory which deal with the making of these landscapes - the idea of nature and culture. Landscapes have been intrinsically crafted by superimposing the strata of 'culture' on 'nature'. Spatiality of landscape has been a definer in developing culture and experience of landscape viewer/ observer. Hence, it can be imagined that the meaning of the landscape does not lay in the physicality of the landscape itself or the observer of the landscape, but in the interaction between the observer and the landscape (Mcgreevy 477-479).

The following is a spectrum of ways of looking at landscape wherein the column on the extreme left comprises of elements of landscape whose meanings could be directly communicated with lesser ambiguous approach and as we move towards the right end, meanings are changed as per the individual/observer of the landscape. Recording arts like cinema and photography cover the entire range of the spectrum since it deals with all the aspects of landscape representation and recording. All the lenses mentioned here could be perceived to be an overlap of one another. However, the table only establishes the various ways of 'seeing' landscape.

Environmental	Practical	Pictorial	Dramatic	Narrative
Horticulture				
Ecology				
Religion				
Architecture	Design			
		Painting	Land-art	
		Philately		
		Textile		
		Graphic	Theatre	Literature

The paper delves into cinema as an art form to find the cultural meanings of landscapes. It looks at landscape in cinema where people, places, and spaces are re-presented in the cinematic vision. It investigates interaction outcomes between spatiality and experience of the landscape through the cinematic lens. The paper investigates landscape perception and representation through the cinematic lens.

### One: Landscape and Cinema

### 1.1: Representation of Landscape

The often ambiguous definition of 'landscape' characterises it as a way of seeing the world. Based on viewpoints of people observing a certain landscape, the representation of the same would vary significantly. All these 'lenses' inform us about that particular landscape even though they may be extremely contrasting in their schema.

### 1.1.1: Landscape and Painting

Since the pre-historic times, paintings have offered to be a window to everyday events happening in a human's life. These representations of landscapes have been acting as records of Indian landscape design. At times, these landscapes boasted of fictional spaces and at the other times, paintings recorded nuances of the existing landform.

1. time.



Figure 1: Rock as a canvas depicting everyday life Source: http://www.wondermondo.com/Best/As/IndMedCavePaint.htm

Landscape in Indian Cinema

Bhimbetka Caves, Madhya Pradesh (5500BC): Five clusters of natural rock are home to paintings that date back to the Mesolithic period. These paintings, widely done in red and white paint, represent themes taken from activities of daily life like cooking, hunting, animal fighting, horse riding, dancing and music. Landscapes (the natural rocks) were used as a canvas and superimposition of paintings on the same canvas depicted the layer of culture prevalent over

2. Mughal Paintings: The paintings by Bishandas depict Babur supervising the layout of The Garden of Fidelity in Kabul (Afghanistan). The first painting shows Babur watching men altering the course of stream for the garden. The second painting shows a clearer view of the Charbaug depicting the planting of this garden.



Figure 3: Charbaug planting Figure 2: Babur altering the landscape Source: https://archive.org/stream/baburnamalmages

# 1.1.2 Landscape as Theatre

Using theatre as a metaphor for landscape suggests three things: 1) theatre as a system of communication with its own set of rules and symbols, 2) people control and design their surroundings as if it were a stage, and 3) people consider themselves to occupy the centre stage (Jackson ). It is important to consider the analogy of theatre for landscape since it offers importance to the visual side of environment along with scaling the 'scene' to a specific space and time.

1. The Theatre at Delphi: Built in the 4th century B.C., landscape acted as a natural backdrop to the performances held. The theatre was sited according to this view.





Figure 4: Backdrop of the extant, Delphi Figure 5: Without the backdrop, Delphi Source: http://ancient-greece.org/architecture/delphi-theater.html Author's interpretation

2. ferry. Landscape is an active character of the narrative.



Figure 6: Fictional backdrop, Shakuntala Source: http://adventurecrew.co.in/wp-content/uploads/2013/04/IMG\_9710-7.jpg Author's interpretation

3. backdrop.



Figure 8: Raja Harishchandra scene, Film

Shakuntala: Abhigyanshakuntalam is a Sanskrit play by Kalidasa. Adapted by many writers over the years, this scene shows Shakuntala's travel to Hastinapur through a river in a canoe



Figure 7: Without the backdrop, Shakuntala

Raja Harishchandra: The film's story is taken from the great epic Mahabharata and was an established tale in theatrical adaptations. The narrative was framed as if the scenes were being enacted in a theatre. Landscape provided a space to let the drama unfold as well as provided a



Figure 9: Raja Harishchandra scene w/o backdrop, Author

### Two: Cinematic Landscapes

### 2.1 Identities of Landscape in Hindi Cinema

In a country like India with rich history but a pre-dominantly illiterate society, non-verbal documents in landscape can be powerful visual signs and convey messages forcefully (Baker and Biger ). Cinema can be a useful lens to read landscape.

Popular Hindi cinema has peculiar ways of addressing landscape. This proposition is based on my perusal of the following literature and theories:

- Lukinbeal, Chris. "Cinematic landscapes." Journal of Cultural Geography23.1 (2005): 3-22. 1.
  - Landscape is central in the formation of cinematic space
  - Landscape and film are social constructions .
  - Attachment of landscape is through culture, attitude and experience
- 2. Barber, Stephen.Projected cities: cinema and urban space. ReaktionBooks, 2002.
  - When film interacts with city, corporeal, architectural, cultural, historical and social forms are projected.
  - Physical or sensory dimensions interlock with the urban space.
- 3 Helphand, Kenneth I. "Landscape films." Landscape Journal 5.1 (1986): 1-8.
  - Establishes four approaches to represent landscape in cinema -Subject, Setting, Char acter, Symbol
  - Derived pre-dominantly from Western cinema •
- Higson, Andrew. "Space, place, spectacle." Screen 25.4-5 (1984): 2-21. 4.
  - Proposes four functions that landscape can serve in narrative cinema -Place, Space, Spectacle, Metaphor
  - Derived from all kinds of cinema –Western and International •

Based on the study of this and viewing a wide range of films (See Filmography) of the post-independence era, I arrived at the following ways in which the Hindi cinematic landscapes could be looked at. . While there may be many more perspectives to understand the same, I will limit myself to these five:

- 1. Place
- 2. Space
- 3. Spectacle
- 4. Metaphor
- 5 Character

### 2.1.1 Landscape as Place

The notion of place-making gained importance when globalisation entered the Hindi cinematic space. While 'foreign' locations were common for shooting since the 1970s, especially for song sequences (Elliott, Payne, and Ploesch) (Silsila (1981), Chandani (1989), etc.), 1990s marked a discernible shift in the 'place'-making of cinematic space in Hindi films. This was first done through Dilwale Dulhaniya Le Jaavenge (1995) (DDLJ hereafter) where a foreign location (London) was used as a setting to mark the Indian middle-class immigrant population living in such locales. These places were as appealing as shown in the earlier films but they had the layer of 'realism' added to it. Opening sequence of DDLJ showed the landmarks of London city like Trafalgar square, the Big Ben, the Tower of London and the Buckingham palace.

## 2.1.2 Landscape as Spectacle

Landscape in cinema can simply be aesthetically pleasing. This can be drawn from the metaphor 'landscape as theatre' coined by J.B. Jackson. Using the same, one can imagine landscape to merely be a scenery – a background upon which events are staged. As spectacle, landscape has multiple functions in one image (Lukinbeal 3-22). As for instance, in the master shot, landscape serves as both place and spectacle and it is difficult to segregate the two as categories for the same.

In DDLJ, Simran, the elder daughter of Baldev, seeks permission to travel around Europe for a month before heading to India for getting married. The pastoral landscapes of Europe have been used as a backdrop to the protagonists' blooming romance. When there is a plot shift, the fields of Switzerland get translated to the fields of Punjab with the same functional use. At some level, this makes one question the choice of a given landscape. After probing further, it is clear that the film uses 'fields' as a backdrop throughout the narrative for romance to happen. This can also be considered to have something to do with the 'colour' of flowers in the Swiss locales; which is similar to mustard fields of Punjab. Interestingly, the landscapes of Switzerland as a spectacle in DDLJ serve an aesthetic purpose while the pastures of Punjab as a spectacular environment create a certain curiosity for the narrative to unfold itself.

## 2.1.3 Landscape as Space

From an opening shot of a rural landscape, emerges a dancing acrobat leading a tribal group walking in the middle of a bleak landscape. The landscape is composed of huge boulders and earth but is surrounded by green vegetation. The narrative when the son of a landlord who is leading a 'city' life is sent to the 'country' to take care of their fields. The landscape of this feudal modern-day village offers a space to represent the culture and societal system of a rural life in Shyam Benegal's Ankur (1974). Concurrently, the landscape of the fields symbolises power and allows dialogue between the landlord and villagers, water conflicts, and dichotomies of urban-rural ideologies to take place. The landscape narrative is read as a space rather than a definite place and is re-presented by perceiving landscape as a setting where the drama unfolds.

Landscape tends to position these narratives within a definite scale and context without which it would be impossible for the viewers to imagine a certain situation (Lukinbeal 3-22). 'Space' in cinema defines a social space and it focuses on social narration than reality of the location (Soja). The description and interpretation of such landscapes give us an idea of transformation of natural landscapes to cultural landscapes.

### 2.1.4 Landscape as Character

The way spaces are used and places are portrayed in cinema reflect the prevailing culture, ethics, and society. It is at this point where 'landscape' is envisioned as an active facet of the narrative.

Awaara (1951) is a story of a vagabond who is forced to move to the city after his mother is accused of cheating on his father, a judge. Judge Raghunath's wife is kidnapped by Jagga, a crook who is wrongly accused by the Judge on the account of rape. It is this city of Bombay which moulds the protagonist to join the path of crime. Here, Bombay acts a plot in the narrative not only because it happens coincidently due to the shift from the rural setting, but also due to the opportunities it offers for a 'better' living. Awaara throws light on the socio-political constructs of the city where, post independence, there was a wave of rural migrants coming to the urban city in search of employment and a better life. The film climaxes with protagonist representing the duality of the urban utopia: the conditions of the underprivileged in a seemingly prosperous city. He blames the exploitation of the poor by the city for pushing him towards a life of crime citing examples of the poor conditions of the chawls with no light, less space, and poor drainage where he has spent most of his childhood.

### 2.1.5 Landscape as Metaphor

Metaphor in cinematic landscapes can be perceived to be similar to landscape as a spectacle (Lukinbeal 3-22). However, unlike spectacle, landscape metaphor in cinema delves into the hidden meanings of landscape. Some examples of the same use landscape very rhetorically.

Gardens in Hindi cinematic landscapes have been used as a metaphor of romance. The many gardens of Mughal-e-Azam (1960) allowed the protagonists to fall in love with each other. It was that uninterrupted space where the actors were free from the social constraints. These constructed gardens in the narrative were donned with flowers, vines, trees, fountains and drew their inspiration from the Mughal garden layout.

### Conclusion

Through my research, I have argued that the usage of spaces and portrayal of places in cinema reflects the prevailing culture, ethics, and society.

Studying the use and representation of landscapes in paintings and theatre gave me an understanding of how spatial experiences could be communicated. Based on this, I synthesised various identities of landscape in Hindi cinema: place, space, spectacle, character and metaphor. Landscape as space and place suggest the process of looking at the image-ability and identity of landscapes. Landscapes have been used for narration by turning a place to space. This can be represented by conveying landscape as a spectacle and/or metaphor. When landscape is used as spectacle in cinema, the observer starts responding to the quality and sense of landscape. Meanings of landscapes can be acknowledged by identifying landscape as a metaphor.

Cinema also makes the observer interact with the social space that it seeks to depict. The observer, as a flaneur, responds to the style of landscape and changes in the physicality of space. This is when landscape, like a character, is an active participant in the cinematic space. The thesis researches the same by considering different environments used for cinematic representation rural, urban, ecological, and human-centric to name a few. I investigate the urban landscape by examining the city of Bombay as seen in Hindi Cinema. My research finds that films have not only used the landscape as a setting, but it also has reflected our changing attitudes towards life.

From this, I conclude the following three notions of landscape in Hindi cinema.

- Landscapes can be created for cinema: 1.
  - a. completely imaginative (Saawariya).
  - b. Through computer aided generation (Baahubali)
- 2. done through dislocation of landscapes (Kabhi Khushi Kabhi Gham).
- 3. there are the following possibilities in perceiving such landscapes:
  - Landscape as an appropriation of images in the lived environment a.
  - Desire to live in a space as projected in cinema b.
  - Aspiration of visiting the landscape shown in cinema C.

Landscape is thus central in formation of Hindi cinematic spaces and the impact of cinema on the audience can structure social, cultural, and environmental experiences. (2410 Words)

Through sets that draw inspirations from the real world (Pather Panchali) or are

The use of landscape could either be realistic (Satya) or depict fantasy (Hum Aapke Hai Kaun) and would solely depend upon the filmmaker's vision and the genre of the film. This can also be

The perceptions of landscapes of the observer depend upon the above mentioned points and

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