ARCHITECTURE AND DESIGN

INTERNATIONAL SYMPOSIUM 2021

SCHOOL OF ARCHITECTURE AND DESIGN
WALAILAK UNIVERSITY

ARCHITECTURE AND DESIGN

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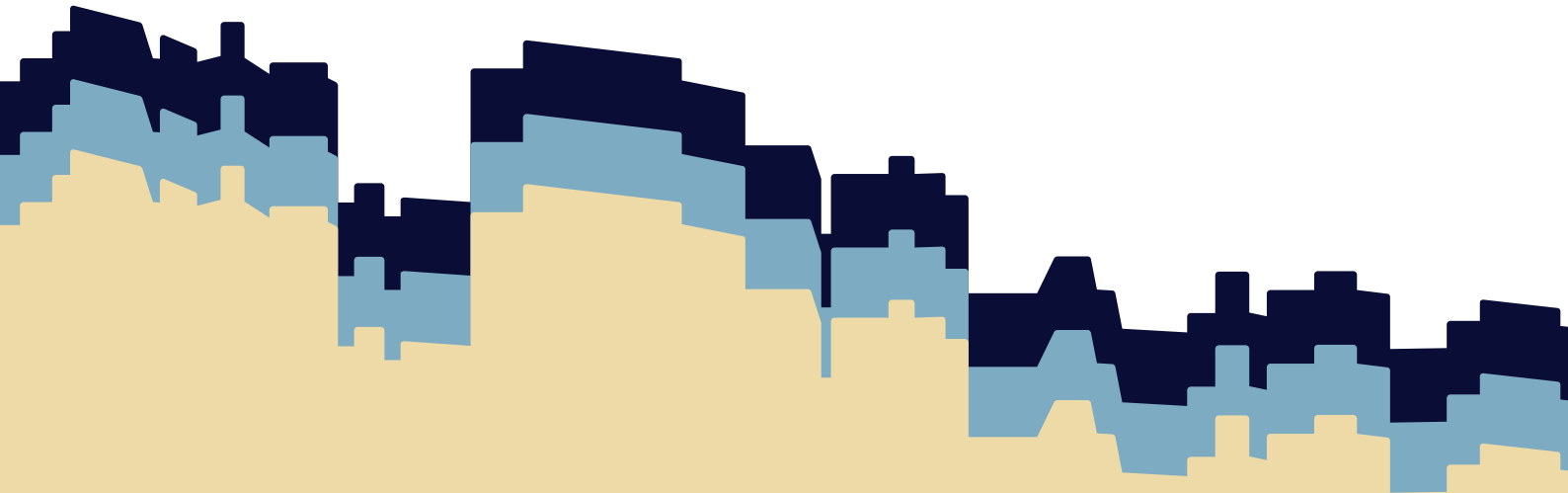

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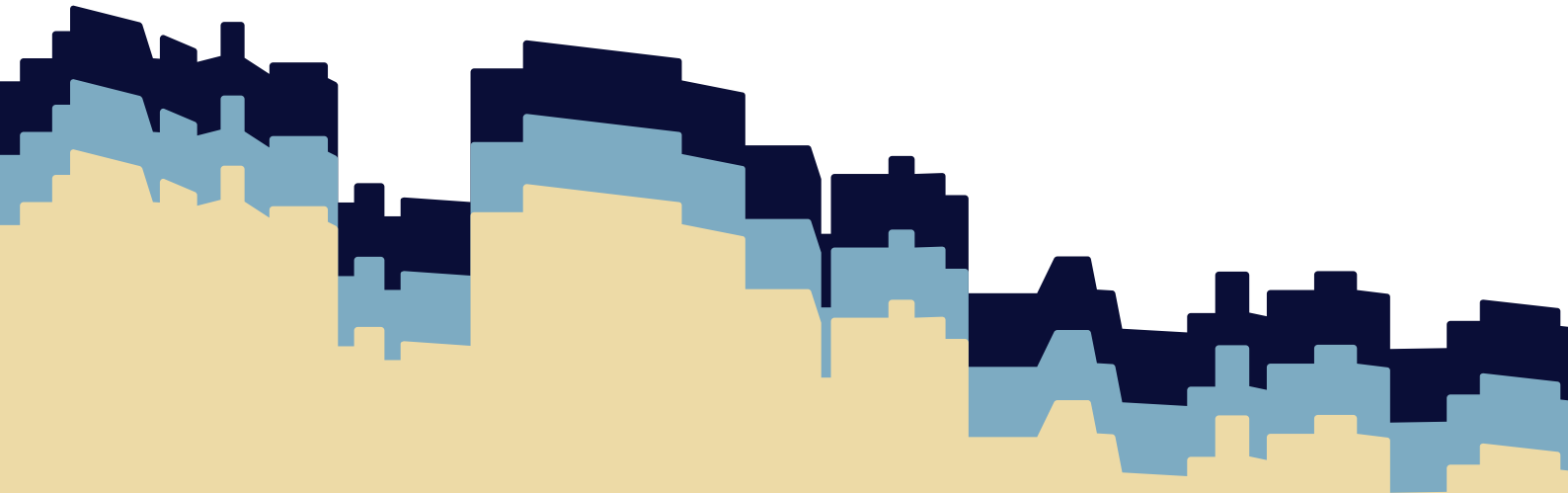

THE COMMUNITY ARCHITECTS CHALLENGES IN URBAN POOR AREA

ASSOC.PROF. SEIJI TERAKAWA

KEYNOTE SPEAKER

The Community Architects' Challenges in Urban Poor Area

Day laborers /Homeless Town
KAMAGASAKI

The Community Architects' Challenges in Urban Poor Area

Day laborers /Homeless Town
KAMAGASAKI

Community Architects for Shelter and Environment is a group of Thai architects formed in 1997 with central interests in alternate dwelling visions. We joined in 1998. Known as **CASE**, its major concern lies in the relationship between dwelling and physical, cultural as well as socio-economic contexts.
Both the physical environment and the human elements of the place are considered vital to **CASE**'s working mentality.

1998, CASE-Japan :CEO
Community Architects for shelter and Environment
Community development planning & Architectural Design office
2011～ KINDAI Univ.
Faculty of Architecture

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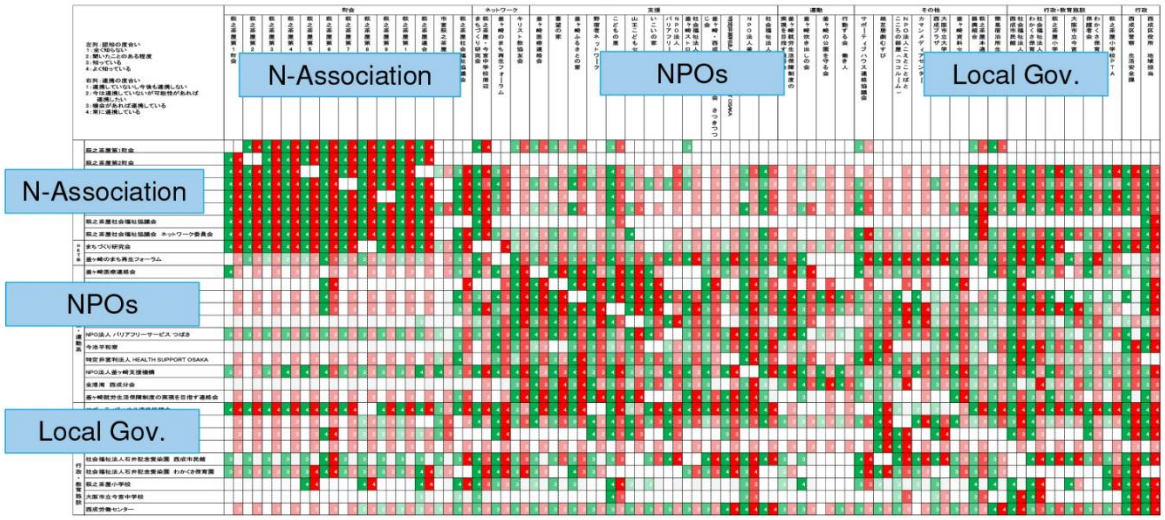
Connection of the organization in this area 100 organizations → research



Discussion Group for Town Development around Haginochaya Elementary School/Imamiya Junior High School

■ 2005: A discussion group for town development was established mainly by the Haginochaya association <Project Coordination Bureau's town development support>

Extremely serious social problems

(difficult for local people to tackle)

Garbageproblem Illegal dumping
Tuberculosis
Gangsters
Gambling
Stimulants
Stalls
Wild dogs
D
H

However, these must be addressed!

First narrow down themes, and begin with easy things!
Develop our town into one that is "normal" and "never gives up"

Main theme "Children and Environments"

- Area that has elementary and junior high schools
- Theme that is easy for everyone to share
- Looking at the town from children's viewpoints helps realize various issues, doesn't it?
- Begin with improving environments around the elementary school, not solving the entire town's issues.

"Expanded Meeting for Haginochaya Town Development"

- In 2008, the meeting was set up by calling on regional organizations for cooperation, in order to fulfill "the creation of a place for regional collaboration"—a purpose of the Discussion Group for Town Development around Haginochaya Elementary School/Imamiya Junior High School.
- Relaxed platform where people overcome mutual differences and begin with things that they can share in to develop town through concrete activities.
- Unorganized intentionally and kept as "tentative name" to create an environment that facilitates connections.

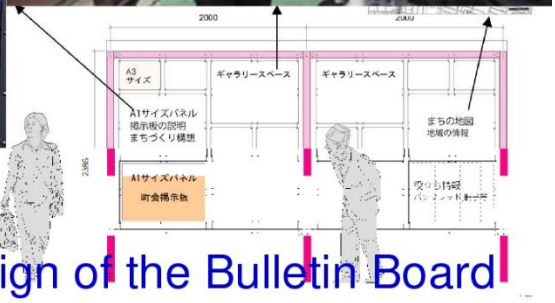
■ Current main members

A meeting is held on the 2nd Friday of every month (basically, everyone can attend freely)


"Re-in-inovation"community movement
get over "the difference"
萩之茶屋から
覚醒剤を排除しよう！
西成区萩之茶屋"覚醒剤撲滅キャンペーン
キャンペーンパレード開催
皆さんの参加を募集しています。
11月20日（土）
午前10時～（1時間程度を予定）
集合場所：今池こどもの家 前
war on drugs


This park → 30years Closed
LET'S MAKE THE PARK WHERE YOU CAN HEAR THE VOICES OF CHILDREN!
Workshop for renovating the park

Design of the Community Road



Design of the Bulletin Board

Re-Connection → MACHIDUKURI Vision

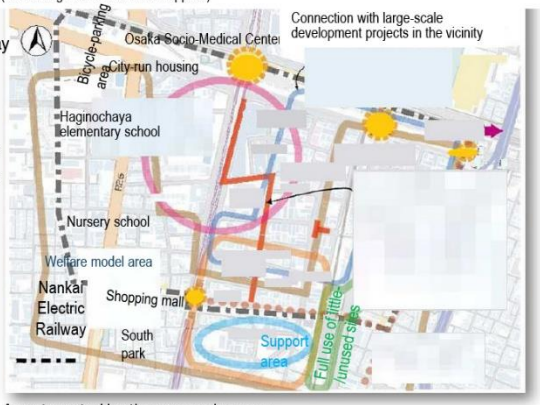
Map of the community development vision (draft) prepared by the research group for community development around Haginochaya elementary school/Imamiya junior high school

Restructuring cheap lodging houses
Creating welfare-oriented housing
- Promoting revitalization of the area/exchanges between people
  Setting up information centers for foreign travelers, etc.
  Accepting people with diverse backgrounds ⇒ Visit Japan Campaign
-Temporary evacuation centers in a time of disaster (sub-storage centers of relief supplies)

Heart of the area: Local revitalization zone
-Promoting development of the local revitalization zone, while rebuilding structures in the zone and using them for different purposes
-Turning community centers into disaster prevention spots
⇒ Assessing the earthquake-resistance strength of the buildings
-Rebuilding public housing, consolidating elementary schools

Area to be renovated for disaster prevention
<Wooden construction-concentrated area>
-Measures for an aging society
  Barrier-free Care
-Disaster prevention/earthquake-resistant buildings
-Renovation/improvement
-Removal/full use of vacant houses

Area to be renovated for disaster prevention
<Wooden construction-concentrated area>
Turning the park into a usable park for children, etc.



Area targeted by the research group

Trying to become a zone symbolizing community development!
-Greening an environment around the elementary school
-Improving roads on the east side (North park – shopping mall)
⇒ Fencing roads with flowers/greenery instead of "guardrails" in a less prominent way ⇒ Managed by the community
Discussing the implementation of one-way traffic
⇒ Measures against street vendors
Removing/regulating harmful street vendors
Responding to those who rely on the income from business on the road for living
*e.g.: Creating a village of street vendors making use of little-/unused sites in the area
Making full use of vacant houses (fixed-term use)
⇒ Subsequent management and maintenance are crucial for successful street vendor control.
Active community involvement required!
-Promoting cooperation/collaboration with the government
-Looking for a town in which young people and children can live without worries

Around the shopping mall
-Bustling boundary area which connects people in the town
-Responding to foreigners' needs
-Making full use of vacant stores
⇒ Challenge shops

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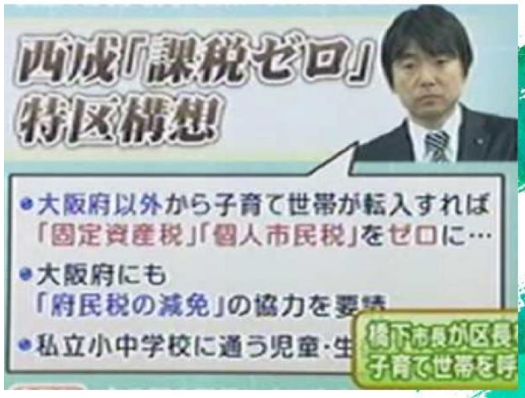
1/18/2018 press conference

I favor Nishinari Ward.
And we will make this area a strategic special zone



New mayor HASHIMOTO in Osaka City

We were annoyed-troubled.
Will we do the opposite movement or do the policy movement that we accepted at the resilient?

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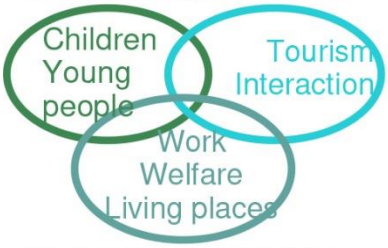
As a result, we decided to promote an alternative policy movement.

3 Themes/9 Projects/300 ideas

Themes of town development	Various projects	Concrete ideas



Organize town development visions into three main themes. Raise as many as 9 projects and over 300 action ideas.
Overcome "contradictions" or "slight insufficiencies" in existing systems through the use of the special zone.
=> Meaningful to society.

Living places
Tourism/interaction
Children/young people
Work/welfare

- Safety net enhancement project
  => Social resources, welfare, and medical care.
- Collective town project
  => Living places, places to stay, and connections development.
- Anti-disaster capability improvement project
  => Urban areas with densely built wooden buildings, and support knowhow.
- International terminal project
  => Interaction, and tourism.
- Young people's living environments creation project
  => Challenge, employment
- Regional elementary-to-middle school educational continuity promotion project
  => School utilization, and environmental improvement.
- Child raising project
  => Child raising support, and living place development.
- Environmentally sustainable industry development project
  => Eco-friendliness, and regionally useful work creation.
- History inheritance and sharing project
  => Dissemination, and sharing.

Over 300 ideas:
- Information distribution and collaboration for town development
- Collaboration with the police over waste and stimulant drug issues
- Installation of bus terminals and tourism advertisement
- One-stop provision of information on the entire region
- Streets with many food stalls, and hostels, where young people gather
- Creation of shopping streets and places to stay that are good for sightseeing.
- Creation of regional industries through recycling
- Work useful for local communities through watching over of children
- Information center for various employments in and outside the district.
- Creation of various places for single elderly people to stay
- Maintenance and utilization of Haginochaya Elementary School's facilities
- Creation of housing provided with child support
- Attraction of or collaboration with advanced medical facilities
- Establishment of archives for the history of the workers' town
- Development of connections in and outside the district through art
- Employment support through art by physically challenged people.
- Alleviation, survey, and research of problems with the quake resistance of regional buildings, and provision of learning opportunities and information regarding the problems.

...etc.

Five points to consider when making proposals

1. 地域資源の再価値化

1. Re-providing value to regional resources

2. マイナス(イメージ)をプラスへ

2. Making negative image positive

3. 漸進的開発による再生

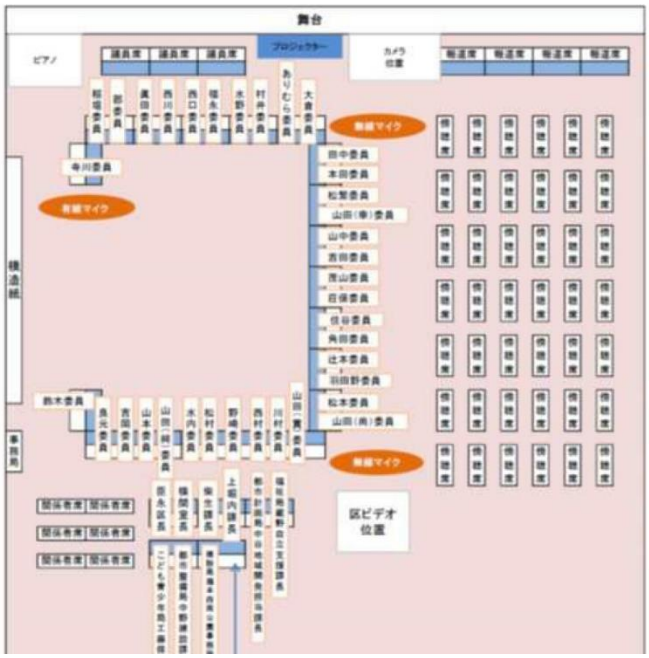
3. Rejuvenating town through revolutionary development

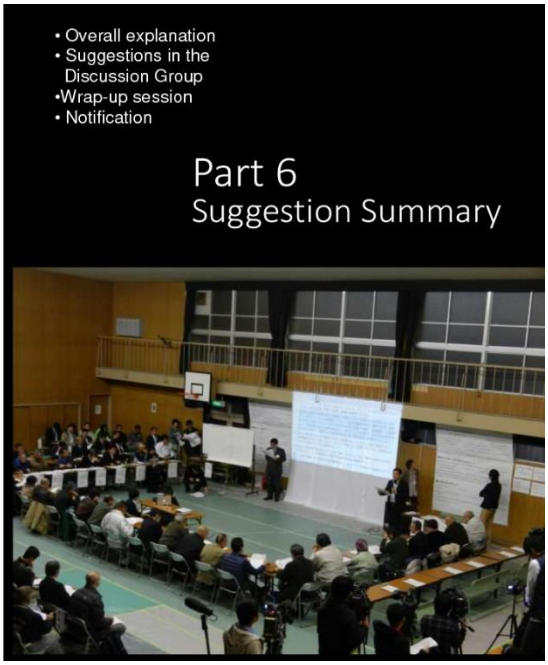
4. チャレンジ型まちづくりの推進

4. Sustainable Town Programme

5. 区民・当事者参画機会の継続的確保　とエリアマネジメント体制構築

5. Continuously maintaining opportunities for local people and parties concerned to participate, and developing an area management system





Towards further **utilization** of the Special Zone Initiative

The residents also launched a Community Management company

Currently ongoing projects

○ Control of illegally dumped waste
Patrol & collection (from 2014)
(Employ 11 local daily workers or welfare recipients every day)

Future projects

- ○ Wall art project
- ○ Vacant house/land utilization support project
- ○ Hostel air-conditioner cleaning project
- ○ Various investigative/research projects

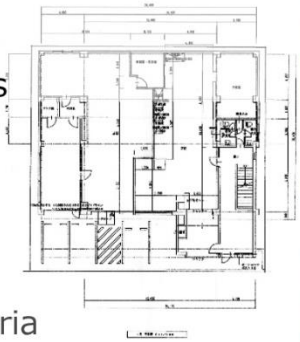
Feature: Anyone who wants to do a project may propose and implement it!

Issue: Securing and fostering of human resources, particularly young people (=> human resource agency)

Special Zone Initiative Implementation Example (2)
This is also useful for us

KAMAPUB
バックパッカーの受皿
情報交差点

Place for backpackers
Information
intersection



The Children's cafeteria has been initiated in Japan and it offers free food to poor Japanese children

ゼミ生の卒業設計として実施

Grope home for women and children

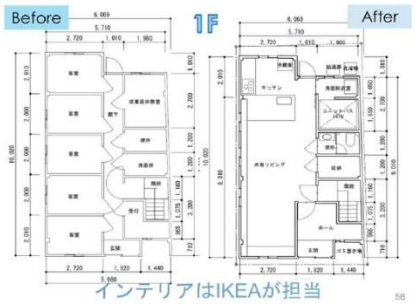
Project description:

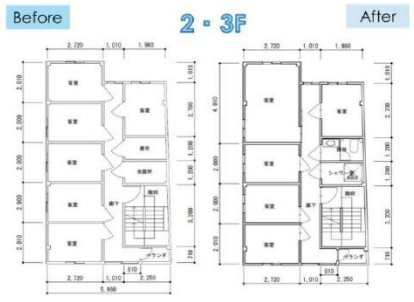
* **Osaka City's home-alone child relief project (after-school care for children)**
* **Small housing child nurturing project (family home)**
* **Osaka City's regional child-raising support center project (Tsudoi No Hiroba)**
* **Children's independent life support project (independence support home)**
* **Independent project <<emergency temporary protection/rest houses, empowerment project, attendant support project, middle- and high-school students'/physically challenged children's place project>>**

http://www.eonet.ne.jp/~kodomonosato/

Owner's requests

- Women or single mother/rest for single-person households or storage/emergency shelter
- The 3rd floor remains a shelter/two rooms each on the 2nd and 3rd floors/3-tatami-mat rooms are narrow/the custodian's room is 4.5 tatami-mat wide
- The form varies depending on the family.
- Flexible plan/washing machines (inside and outside)/island kitchen unit/personal closet
- Shoe locker/mirror at the entrance
- Movable separation/furniture provided/assume there is noise/childcare services



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西成アート:WAN(Wall Art Nishinari)
落書きやない…アートや，アート!!
セピア色のまちにみんなで色鮮やかな夢を描こうや!!

Suggestions from experts about Nishinari Special Zone Initiative: Town Development Vision 2018 - 2022

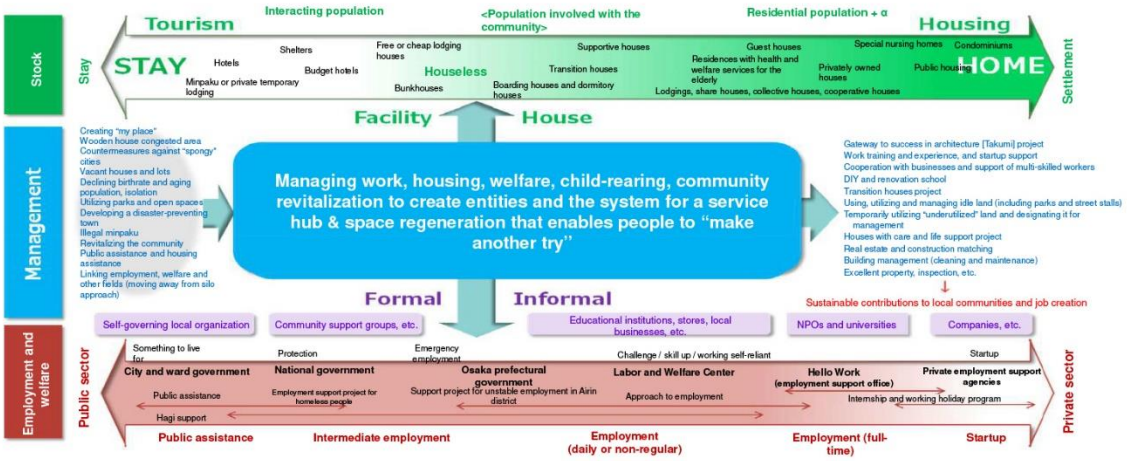
Aiming to revitalize a vigorous and friendly town where cheerful voices of children can be heard!

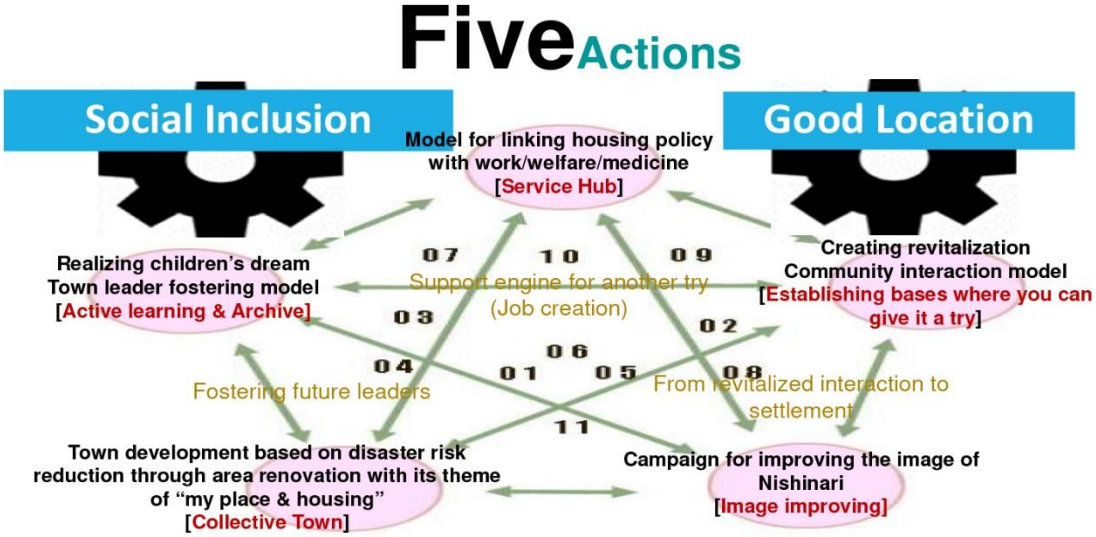
Starting "R Project for Nishinari," a town where people can try again

Promoting development of the town where people "can try again" and where "security" and "bustle" co-exist through implementing the "creation of my place" (a place where people can feel they belong) in the town

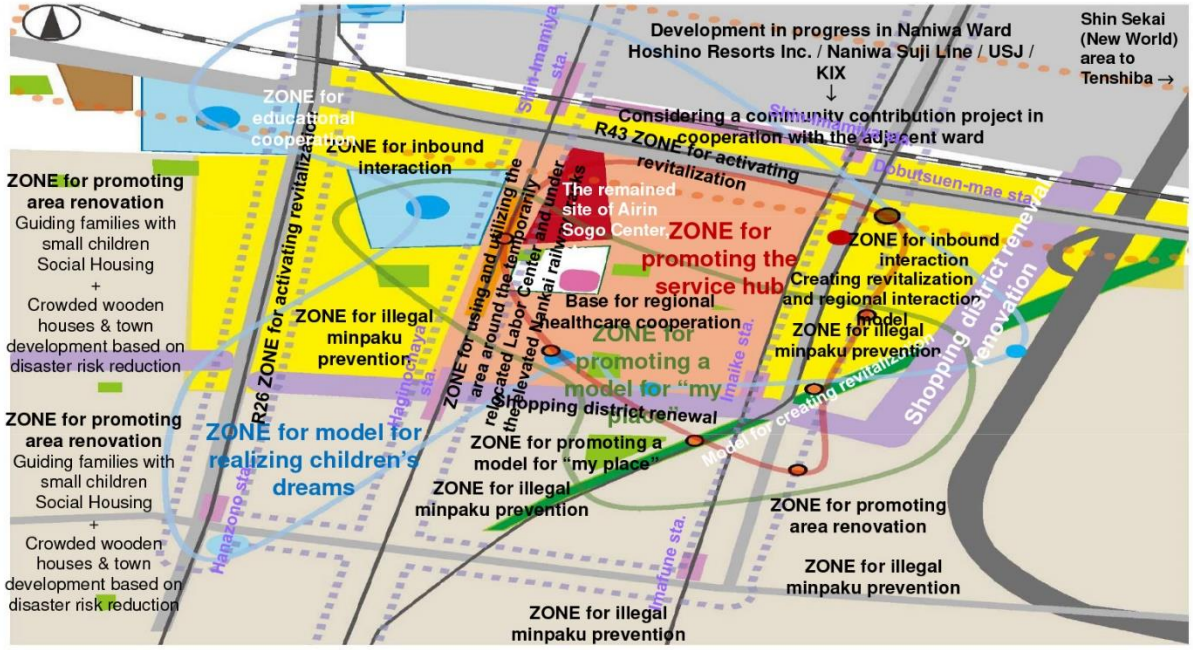
滞在(滞留)と定住，宿泊と住まい，就労と福祉，行政と民間の制度や役割の「間」にあるグラデーション（バラバラであった人的資源・空間資源）を再構築する全国初の試み。

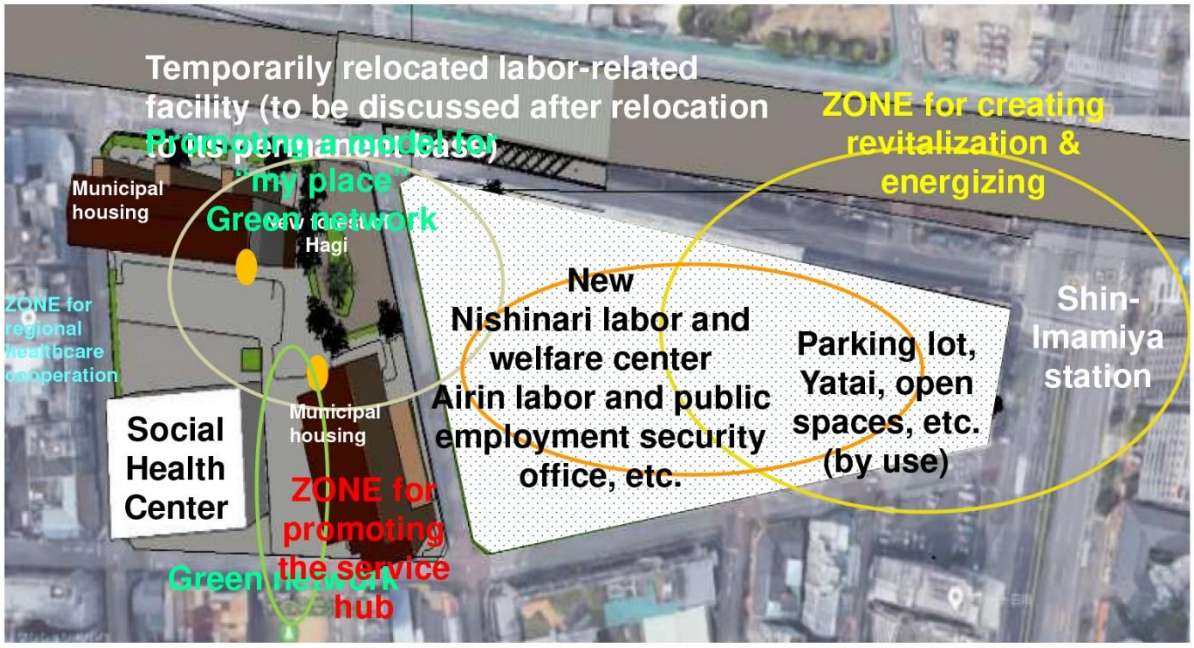
The first attempt in Japan to rebuild the gradations (inconsistent human and spatial resources) “between” stay (retention) and settlement, accommodation and housing, employment and welfare, and systems and roles





Note: Numbers 01–11 are the numbers of the below “twelve stories for town development”


Development in progress in Naniwa Ward
Hoshino Resorts Inc. / Naniwa Suji Line / USJ / KIX
↓
Considering a community contribution project in cooperation with the adjacent ward
Shin Sekai (New World) area to Tenshiba →
ZONE for educational cooperation
ZONE for inbound interaction
R43 ZONE for activating revitalization
Shin-Imamiya sta.
Dobutsuen-mae sta.
ZONE for promoting area renovation
Guiding families with small children
Social Housing
+
Crowded wooden houses & town development based on disaster risk reduction
ZONE for promoting area renovation
Guiding families with small children
Social Housing
+
Crowded wooden houses & town development based on disaster risk reduction
R26 ZONE for activating revitalization
ZONE for illegal minpaku prevention
ZONE for model for realizing children's dreams
Hanazono sta.
Higashi-Imaya sta.
ZONE for using and utilizing the area around the temporarily relocated Labor Center and under the elevated Nankai railway tracks
The remained site of Airin Sogo Center
ZONE for promoting the service hub
Base for regional healthcare cooperation
ZONE for promoting a model for "my place"
Shopping district renewal
ZONE for promoting a model for "my place"
ZONE for illegal minpaku prevention
Imaike sta.
Ichiafune sta.
ZONE for inbound interaction
Creating revitalization and regional interaction
ZONE for illegal minpaku prevention
Model for creating revitalization
Shopping district renewal
ZONE for promoting area renovation
ZONE for illegal minpaku prevention
ZONE for illegal minpaku prevention


Temporarily relocated labor-related facility (to be discussed after relocation
To be determined)
Promoting a model for "my place"
Green network
ZONE for creating revitalization & energizing
Municipal housing
New Nishinari Hagi
ZONE for regional healthcare cooperation
New Nishinari labor and welfare center
Airin labor and public employment security office, etc.
Parking lot, Yatai, open spaces, etc. (by use)
Shin-Imamiya station
Social Health Center
Municipal housing
ZONE for promoting the service hub
Green network

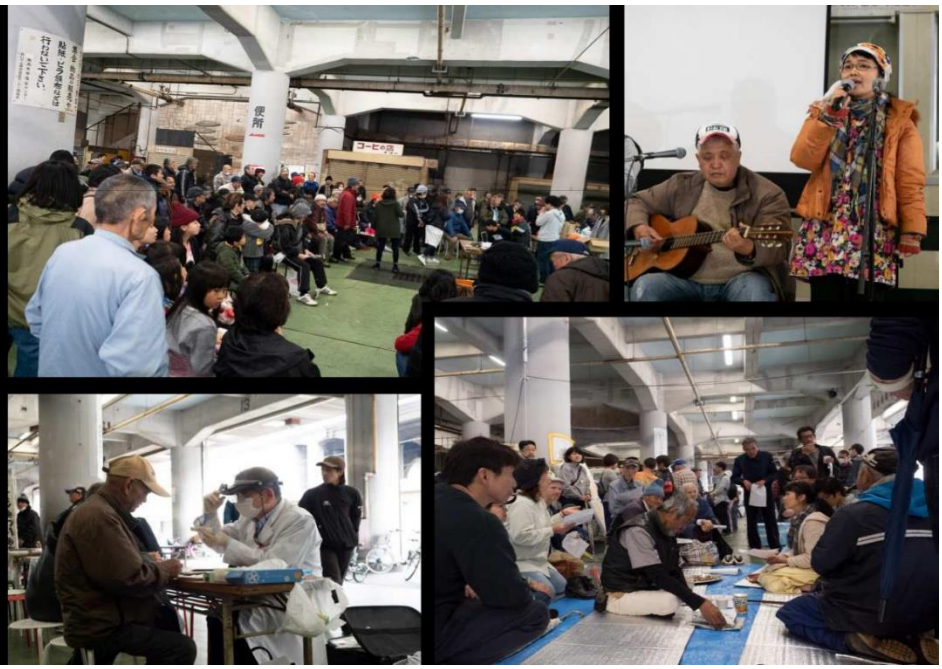






Volume study for development

Workshop with workers



センターの未来を提案する行動委員会HPより
https://www.facebook.com/futureofkamagasaki/?tn-str=k*F

Cross Laminated Timber

CLT

Building Block Container Unit

TSUMIKI Project Concept

CLT材料

Utilization of locally produced timber

地域産材の活用

Restoration disaster prevention

治山防災

New technology development

新技術の開発

SDGs

流通汎用木造コンテナUnit

Unit for disaster prevention
仮設住宅・医療ブース
緊急シェルター等

Event Unit
空地等の暫定活用
イベント＋産地アピール
広告ユニット等

Community Buisiness Unit
製作プロセスの事業化
地域マネジメント資源
として活用 等

- Event Unit In disaster temporary housing, the mental burden and financial costs of evacuees have become issues.
- This unit is made of wall-type wood, there is almost no need for finishing, and the living environment of the unit with the scent of wood is outstanding.
- This unit is the same size as a general distribution container, so it is easy to move and use.
- This unit that utilizes locally produced materials, it can be used as a branding tool, including for restoration.
- At this stage, it is possible to stack up to 3 floors, and it is possible to consider installation in a fireproof area by "burning margin design" considering the wall thickness.
- By being able to install vehicles, it will no longer be a building and will be easier to move around, expanding the range of event utilization.
- The possibility of temporary use of salted idle land and vacant lots will increase.
- The space for equipment is planned on the ceiling or floor, it is easy to plan and renovate at the time of the event.

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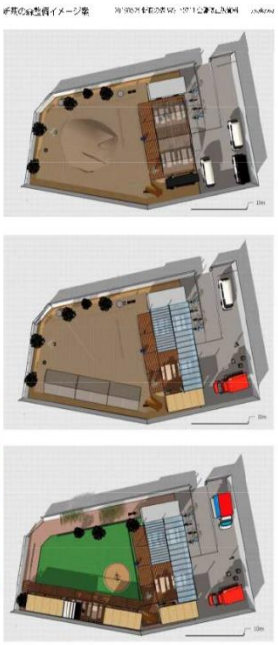
項目	概算費(円)	備考
CLT 材料費	1,000,000	部材量による
運搬費 設置費	250,000	敷地形状 による
設計費等	250,000	
開口仕上 材料費等	500,000	サッシ、屋根 ファサード グレード による
車両費 登録費	(400,000)	なしの場合基礎 工事必要
概算 計	2,000,000	

現在進行中の
まちづくりプロジェクト
設置予定地

大阪市西成区
西成特区構想
における
市有地・広場
の暫定活用

大阪市西成区
萩之茶屋地域

2012年に始まった大阪市による「西成特区構想」から１０年。西成区あいりん地域（釜ヶ崎）では、街が大きく変化してきている。小学校移転、労働センターをはじめ病院や市営住宅の建替えなどが行われる一大プロジェクト。地域の小学校跡地で実施される本プロジェクトは、その一環であるが、これまで交わることの少なかった（元）労働者と子どもをはじめ多様なアクターが居場所づくりを通じてつながる契機となっている。段階的に広場の運営を通じて地域の地価路を付けながら、北側にできる大きな跡地広場の運営を目指す。本ユニットは、多様な立場を横串化する実践ツールとして、各地のまちづくりの「もう一歩」を踏み出すきっかけとなると確信する。



To raise resilience “10 recipes”

レジリエンスを高めるための
10のレシピ

① Make mutual relationship visible (we will pick up a tweet and create a place for people to notice)
② Create a place to get information (to make ally / to uncover actors)
③ We know that each other is "different" and find mutual common languages (themes). Swapping positions and roles
④ Actors build mutual trust,take advantage of roles
⑤ Create challenging opportunities/ Have a successful experience
⑥ Vision creation and involvement in politics / measures(position as measures)
⑦ Government and administrative power → top down is not to use citizens to obedience, but to use to encourage bottom-up.
⑧ Create a sustainable system. To sow.
⑨ Break out of blueprint form/From Waterfall to Agile
⑩ Design conscious of time/Do not build everything/Designing informal system

① 相互の関係が見えるようにする（つぶやきを拾いあげる。その人が気づく場をつくる）
② 情報を得るための場をつくる（味方をつくる場・アクターを発掘する場）
③ お互いが「違う」ことを知ることからはじめ，相互の共通言語（テーマ）を見つける。主客が入れ替わる場
④ アクターが相互に信頼を構築し各々が役割を活かす場
⑤ チャレンジの機会をつくる・成功体験を積む場をつくる
⑥ ビジョンをつくり，政治や施策に関与する（施策に位置付ける）
⑦ 政府や行政の力→トップダウンは市民を従順させるために使うのでなく，ボトムアップを促すために使う事。
⑧ 持続可能な仕組みをつくる。種をまくように。
⑨ ブループリントからの脱却／ウォーターフォールからアジャイルへ
⑩ 時間のデザイン／造りこまない・インフォーマルをデザイン


Airin
Kamagasaki
NHISHINARI
Station
Hoshino Resorts
OMO7
Osaka Shin-Imamiya


Different opinions collide over the PR of Kamagasaki Area Image
“We want to change the impression of this Area”
Vs
“Poverty is not a spectacle”
釜ケ崎PRぶつかる思い
朝日新聞 2021年7月8日

GREENING BANGKOK TOWARDS BANGKOK MASTER PLAN ON CLIMATE CHANGE 2021-2030

PATTARANAN TAKKANON

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INTRODUCTION

Bangkok, as a major global city in Southeast Asia and the world, is inevitably affected by the negative impacts of climate change. It is also contributing to deteriorating climate change situation by emitting greenhouse gases (GHGs). The Kingdom of Thailand made a tremendous effort in response to climate change after its ratification to the United Nations Framework Convention of Climate Change (UNFCCC) and the establishment of the National Committee on Climate Change (NCCC). Since then Thai government adopted and implemented national policies related to climate change including the Energy Efficiency Development Plan (EEDP) 2011-2030, the Alternative Energy Development Plan (AEDP), and most recently, the National Master Plan on Climate Change and Thailand Nationally Appropriate Mitigation Actions (NAMAs). Following the national policies, the Bangkok Metropolitan Administration (BMA) has been working in collaboration with Japan International Cooperation Agency (JICA) on Technical Cooperation Project for Bangkok Master Plan on Climate Change 2013-2023 (Bangkok Metropolitan Administration & JICA., 2015). The Master Plan provided the framework for Bangkok to establish a low carbon and climate-change resilient city by introducing future visions, prospects and proposed policies and measures in mitigation and adaption, roles of BMA and its partners, roadmaps and mechanisms to implement efforts in a short, mid and long-term.

Currently, the project has been extended to 2030 aiming to work on 5 sectors: (1) environmentally sustainable transport; (2) energy efficiency and alternative energy; (3) efficient solid waste management and wastewater treatment; (4) green urban planning; and (5) adaptation planning. Only the last sector focuses on adaptation while the rest focus on mitigation approach. The current paper will present merely the work of green urban planning

sector, its mitigation measures, project selection procedure including methodologies to quantify GHG, and selected priority projects to be implemented in short and long terms for GHG emission reduction.

MATERIALS AND METHODS

The Master Plan has a key role to select mitigation and adaptation measures as practical projects based on the assessment of their priority, urgency, and feasibility. To develop a comprehensive and action-oriented approach, it includes assessment of the current and future situations, prioritizing possible interventions, proposing concrete implementation plans of feasible measures. Therefore, it contains a package of Business as Usual (BAU) setting, target setting, and actual mitigation and adaptation measures. In addition, Monitoring and Evaluation (M&E) as well as the Measurement, Reporting, and Verification (MRV) mechanisms were developed to ensure the successful implementation of the Master Plan.

Considering mitigation actions on climate change, it is important to see GHG emission amount by comparing cases without mitigation actions (business-as-usual or BAU) and with actions. In other words, how much GHG is reduced in quantity is one crucial approach to assessing the degree of success in mitigation actions in an objective way. In this Master Plan, GHG emissions have also been quantified for the 2 emission scenarios, namely the case of BAU and the case with emission reduction by taking mitigation actions. The GHG reduction target covers activities of Bangkok until 2030 as the target year of operations under Nationally Determined Contribution (NDC), with a target of 20-25% from the projected business-as-usual (BAU) level by 2030 and 2018 is the reference year with the latest data that is used to measure relative changes of GHG emission reductions to the BAU. The GHG emission in the BAU scenario in 2030 and the sectoral reduction target are shown in the following table.

Table 1. GHG Mitigation Target Summary in 2030

Unit: $MtCO_2e$

Sector	GHG Emission in 2018	Future GHG Emission in BAU Scenario in 2030	Expected Reduction/Absorption amount in 2030	Reduction rate against BAU in 2030
Transport*	11.84	12.82	4.00	-31%
Energy**	25.85	36.97	5.55	-15%
Waste and Wastewater	5.67	6.00	0.60	-10%
Green Urban Planning	-0.05	-0.06	-0.01	+10%
Total	**43.31**	**55.73**	**10.14**	**+18%**

Remark:
* Only emission from land transport (road, rail) and partial water transport included
** Only emission from 3 main sectors included; residential, commercial and industrial

Unlike the big target to reduce tCO_2eq in transport and energy sectors, green urban planning sector is estimated to increase the amount of GHG emission absorption against BAU 2030 by 10%. GHG absorption is to simply multiply activity data (such as amount of electricity used for lighting or fuels used for vehicles) and absorption factor.

GHG Absorption = Activity x Absorption Factor (1)

With limited urban green space, a study was conducted to find the averaged GHG absorption factor of trees planted in Bangkok Metropolitan area in order to estimate effects of GHG absorption by urban greening activities in Bangkok such as urban park construction and tree planting along road sides. It was found that, by average, trees in the park absorb 0.009 ton C/tree/year while street trees absorb 0.012 ton C/tree/year.

GHG absorption is calculated by multiplying activity data such as number of planted trees by absorption factor per tree. Activity data such as number of planted trees, which can be managed and monitored by BMA in BMA controlled area, is measured by district office, and is compiled as statistical data in public park office in department of environment in BMA. GHG absorption factor per tree is calculated as follows.

- Major species of 70% occupancy in distribution by type of whole species are selected using field survey in urban parks and main roadsides of Bangkok conducted by city planning department in BMA and Kasetsart University.
- GHG absorption factor per tree (ton C/tree) by species is estimated using allometric equation of species in FAO (Food and Agriculture Organization of the United Nations) database and DBH (Diameter of Brest Height) of species.
- Averaged GHG absorption factor per tree (ton C/tree) is estimated using distribution by type of species and GHG absorption factor per tree (ton C/tree) by type of species.

From equation (1),

Activity data = Number of planted trees (trees)

Absorption factor (whole area): 0.012ton C/ tree/year *1

	(Road Side): 0.012 ton C/tree/year	*1
	(Urban Park): 0.009 ton C/tree/year	*1
	(Mangrove): 0.75 ton C/rai/year	*2

Source: *1 Estimated by JICA expert team & Kasetsart University

*2 Kasetsart University (Fujitsu et al., 2016)

The absorption factor per area (rai) per year can then be calculated. For the urban park, the factor is 0.825 tCO_2/rai/year where rai is equal to 1600 square meter.

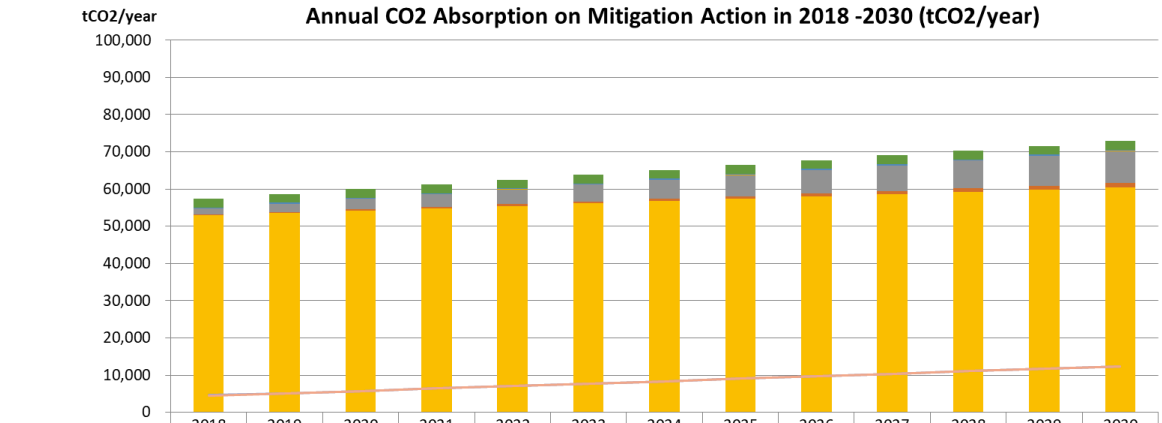
Prior to Bangkok Master Plan on Climate Change 2013-2023, the Green Urban Planning (GUP) sector set the mitigation target for the Bangkok Master Plan on Climate Change during 2007-2013 and following years to absorb 4,047 tCO_2eq/year by 2020. By using trend analysis to study growing numbers of trees planted in BMA areas, BAU Value was set at 45,232 tCO_2eq/year in 2020 and remains the same till 2023 by assuming that planted trees would be properly maintained.

Since the Bangkok Master Plan on Climate Change was renewed to aim at 2030, it is required to set the new mitigation target during 2014 to 2030 according to BMA's record of numbers of trees planted in recent years. Mitigation measures involves 5 categories of green areas: 1) public park, 2) public area, 3) roadside area, 4) Biotope Area Factor (BAF), and 5) mangrove. Nonetheless, access to data was limited and not all annual data was continually collected in consistent format. To find missing values between years, interpolation method was adopted. Number of trees are accumulative as they are added up by new trees planted each year. These are from 2 main sources including the Department of Public Parks and 50 districts of BMA.

RESULTS AND DISCUSSION

A number of trees planted in each green area category were forecasted following the trend analysis and starting from 2018 as the reference year. Since BAF has become a mandatory system according to the Bangkok's Comprehensive Plan 2013, it was assumed that every project applying for building permit must have a half of Open Space Ratio (OSR) as BAF. The new record of building permission led to revising BAF values and CO2 absorption values. BAU values were then adjusted accordingly. The new mitigation target was then set to absorb 12,366 tCO_2eq/year by 2030 as shown in Figures 1. With the updated data, new BAU value

was proposed at 60,525 tCO_2eq/year by 2030 which is about 134% of the previous BAU value. It was found that besides public areas controlled by the 50 districts of BMA, the big mangrove areas had played a significant role in absorbing CO_2 since 2014.



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Mangrove	2332	2332	2332	2332	2332	2332	2332	2332	2332	2332	2332	2332	2332
BAF	239	241	250	258	266	274	283	291	299	307	315	324	332
roads	13	18	22	26	31	35	40	44	48	53	57	62	66
Public space	1650	2228	2805	3383	3960	4538	5115	5693	6270	6848	7425	8003	8580
Parks	165	239	314	388	462	536	611	685	759	833	908	982	1056
CO2 Absorption BAU	52,942	53,574	54,206	54,838	55,470	56,102	56,734	57,366	57,998	58,630	59,261	59,893	60,525
Planted	4558	5028	5722	6387	7051	7715	8380	9044	9708	10373	11037	11701	12366
Countermeasures	4399	5058	5722	6387	7051	7715	8380	9044	9708	10373	11037	11701	12366

Figure 1. Annual CO_2 absorbed by 5 types of green areas as mitigation action in 2018-2030

CONCLUSION

Bangkok's future mitigation actions and targets are in the development process. For green urban planning sector, the new mitigation target was set to absorb 12,366 tCO_2eq/year by 2030 which is about 3 times more than the previous target set for 2020. However, the target is always subject to renew at the appropriate time setting.

ACKNOWLEDGEMENT

I would like to thank BMA and JICA for being a great team and for kindly supporting to work towards greening Bangkok.

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THERMAL COMFORT PREFERENCE OF THE BLIND

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THERMAL COMFORT PREFERENCE OF THE BLIND

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INTRODUCTION

Thai society has attached importance to people with disabilities. As a result, the architecture, buildings and facilities for disables people are important in the design process. The number of blind people in Thailand up to 7 hundred and thousand people. And the Northeast region has the highest number up to 56 percent.

In the study of thermal comfort is a matter of perception and acceptance in the weather, considering the dynamism of environment and the acceptance of psychological comfort of human beings. (Kijchai Jitkajornvanich, 2001) Such as the study of thermal comfort and acceptance of the elderly (Fanger, 1970) found that's different from normal people and varies by terrain, residential climate. The elderly preferred warmer than the average person and the elderly in Thailand are more satisfied warmer than the elderly in cold weather. (Krittin Assavavichai, 2015) The study of thermal comfort of people who living in the same area but different races found that no difference. People can adapt to the environment and weather conditions. (Ellis, 1952) For the blind may have a physical impact on perception, affect the feeling and acceptance in thermal environment.

Study thermal comfort theory and adaptive model to determine the condition that group of person accepts in the climate of the environment. The results can be applied to building's design in response to the need in comfort zone and the benefits of energy saving in the building. This research aims to study satisfaction with the weather and how to adjust to comfort that is suitable

for the blind and compare thermal comfort zone of the blind in the study area with the research of normal people. There are variables that affect satisfaction in the study to create architecture that help the blind live more effectively, happiness and equality in society.

MATERIALS AND METHODS

The methodology of field studies, depending on the living environment and physical characteristics. Estimated to determine thermal comfort zone by shown in bioclimatic chart and study how to adjust to comfort in neutral environment with 3 factors that is affecting to comfort as climate, buildings and building's users. Study processes are divided into 4 steps as shown.

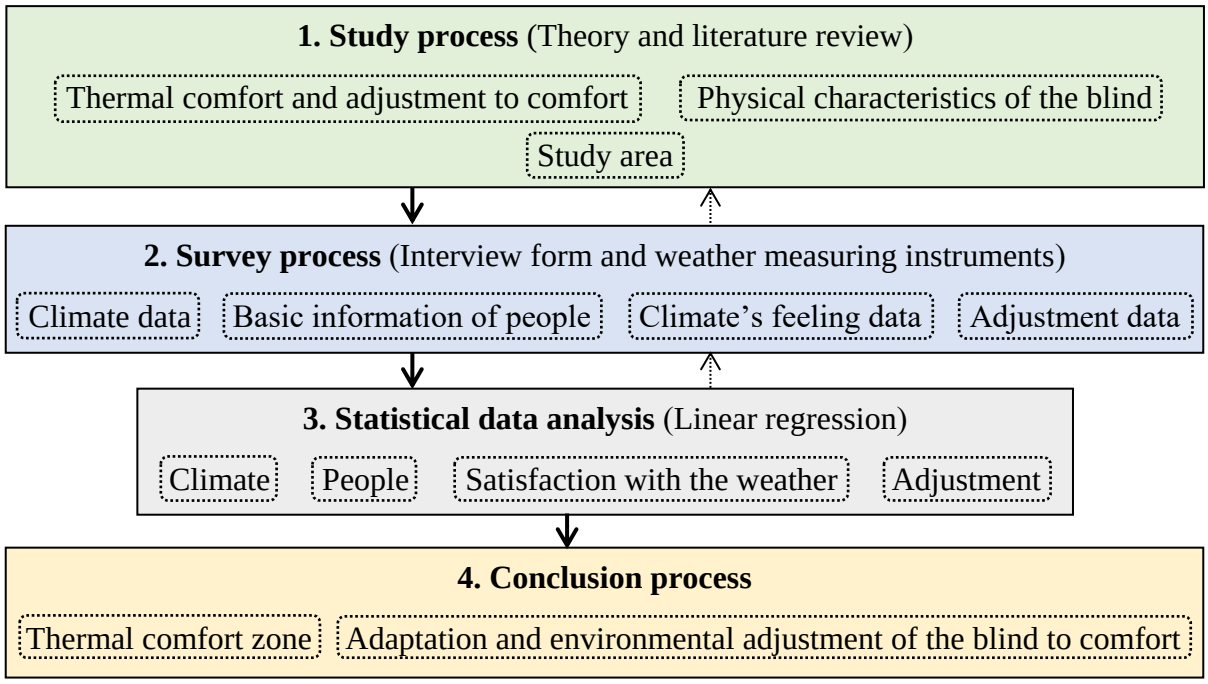


Figure 1. **Research methodology**

Measurement tools include Fluke 975 air meter (Air temperature, humidity and velocity meter) and Heat index wet bulb globe thermometer meter. The measured values are replaced in the equation for the real mean radiant temperature (MRT) as follow.

$$T_{MRT} = \left\{(T_G + 273)^4 + \left[\left(\frac{1.1 \times 10^8 \times V^{0.6}}{\varepsilon D^{0.4}}\right) \times (T_A - T_G)\right]\right\}^{0.25} - 273$$

By T_{MRT} is Mean radiant temperature T_G is Heat radiation temperature of Black Globe
V is Velocity (m/s) D is Diameter of Globe Thermometer (m.)
Ɛ is Globe Emissivity (Thermal radiation coefficient) = 0.95 (ISO 7726, 1998)

Initial data analysis with statistical relationship to find the relationship between variables these influence thermal comfort and bring up the correlation. The results analyzed by simple linear regression, to introduce the value of dependent variables by independent variables. Prove the tendency of average answer from the interview forms.

Considering only the passive system area. Sample population is the blind who living in Khon Kaen vocation school for the blind for at least 6 months, familiar with the weather and domicile in the region. Age 15-60 years old, both low vision and blind. Content scope is considered thermal comfort factors.

RESULTS AND DISCUSSION

From 9 days of survey by randomly collecting 214 interview forms (110 people) at 5:00 am to 5:00 pm. The weather can be divided into the 3 seasons as shown

Table 1. Show the weather ranges from all field data.

Survey Period	Air temperature (°C)	Relative humidity (%)	Air velocity (m/s)	Mean radiant temperature (°C)
Winter (2016 and 2017)	16.9 – 30.4	49 – 82.1	0 – 2.5	15.2 - 30.4
Summer (2017)	33.7 – 38	37.3 – 44	0 – 0.69	33.3 – 37.7
Rainy season (2017 and 2020)	26.2 – 34.9	47 – 84.5	0 – 1.8	25.7 – 34.9
Weather ranges from all data	16.9 – 38	37.3 – 84.5	0 – 2.5	15.2 – 37.7

Current activity that interview respondents done most is sitting and talk (1.3 met-value) and walking (2.0 met-value). The values of clothing insulation range from 0.19 clo-value (t-shirt, shorts and no shoes) to 0.79 clo-value (slip, shirt, jacket, trousers and sneakers). And the highest values of clothing insulation is 0.40 clo-value (shirt and trousers).

Survey area, most respondents lived in semi-outdoor areas at 68% such as canteen, corridor and Thai massage pavilion, second is indoor areas at 23% and outdoor areas at 9%. Most of the blind are moving slowly in the shade. The averages of the answers are as shown

Table 2. Show the average of the answers, feelings and satisfaction with the weather

Scale	Max - min	Choices	Average	Standard deviation	Average of Choice
ASHRAE	-3 to 3	7	0.3	1.78	Neutral
Comfort	-3 to 3	6	-0.63	2.07	Slightly comfortable
Acceptability	0 to 1	2	0.67	0.47	Acceptable
Preference	-3 to 3 -1 to 1	3 7	-0.37 -0.59	0.74 1.37	Unchanged slightly lower temperature
Humidity	-2 to 2	5	-0.24	0.86	Neutral
Velocity	-2 to 2	5	0.4	0.86	Neutral
Sweating	0 to 3	4	0.54	0.77	A little sweat

If the weather is too hot most answer is taking a shower and moving to semi-indoor, if too cool most answer is wearing thick clothes or putting blanket on. So the most common adaptation answer is dressing up and moving to more comfortable place and the answer of environmental adjustment is the opening and closing of windows.

Field survey analysis, bring the answer of satisfaction with the weather to average in each range based on weather variables. Then find the relationship between variables in charts for linear regression analysis. Using equation y = bx + a to find the regression coefficient as shown in charts figure 2 to 3 and when the variable (y) is replaced in equation.

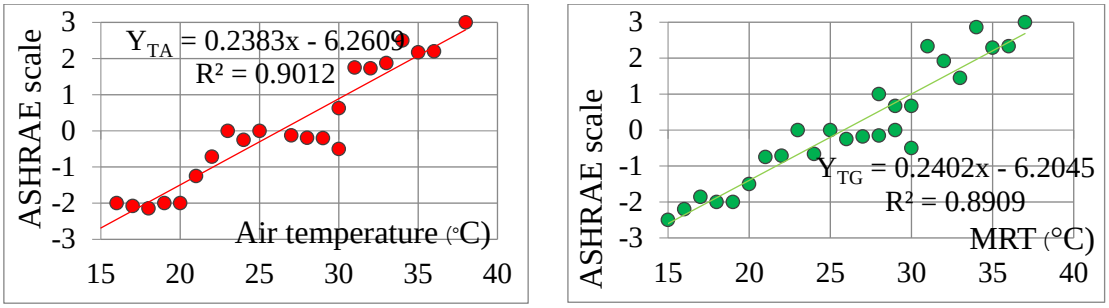


Figure 2. Show chart of air temperature and mean radiant temperature analysis from ASHRAE scale of all data

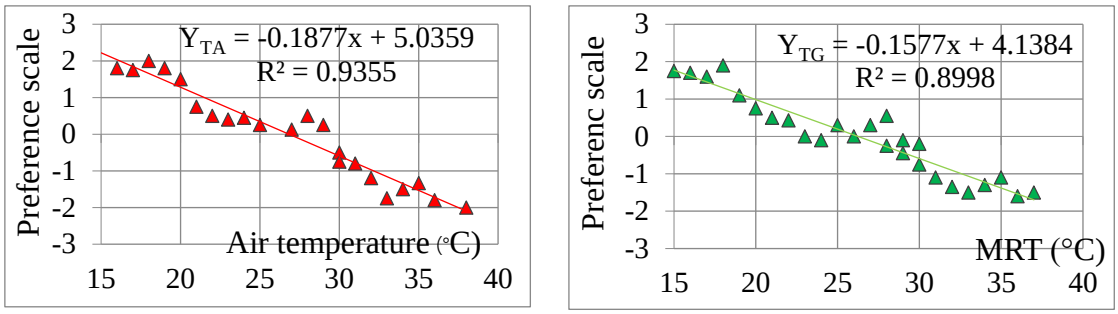


Figure 3. Show chart of air temperature and mean radiant temperature analysis from Preference scale of all data

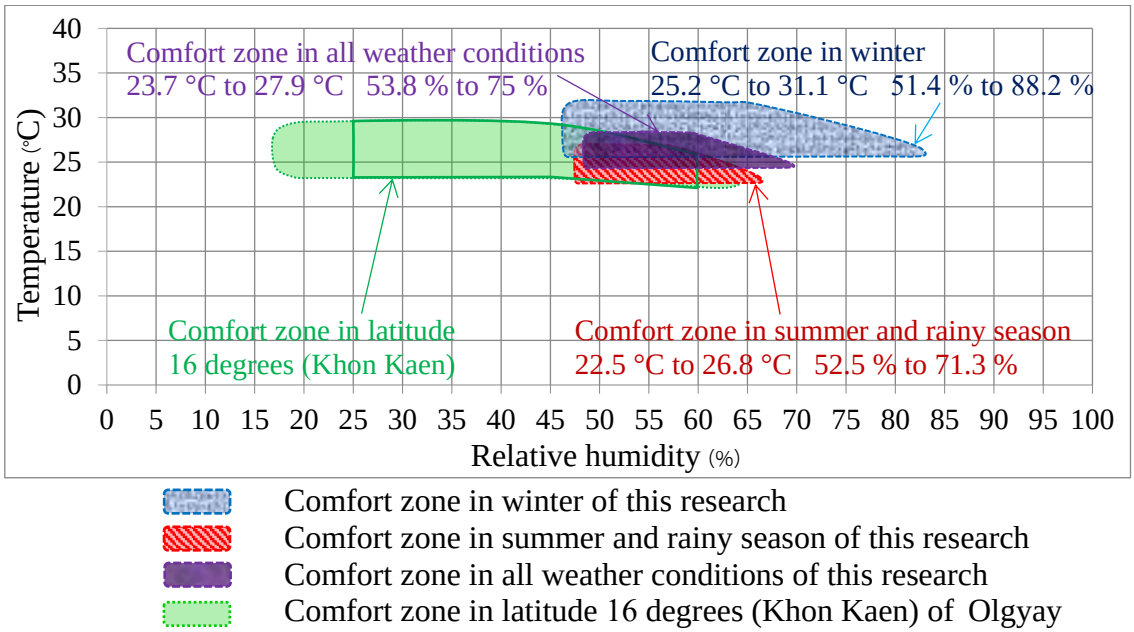
Analyzing relationship between weather variability and the answer of satisfaction with weather, the coefficient of x (b) and constant (a) of equation can find comfort zone by substituting the value y (neutral answer range) in that equation as shown in table 3 and divided into two seasons.

Table 3. Show comfort zone in winter, summer and rainy season and all weather conditions. The comfortable temperature range in this study was obtained by analyzing relationship between ASHRAE scale and mean radiant temperature.

Scale	Variable (y)	Coefficient of x (b)	Constant (a)	Variance (R^2)	Comfort zone Predictive variable (x)
ASHRAE (winter)	0 (neutral) -0.5 to 0.5	0.1683	-4.7404	0.7958	MR temperature 28.2 °C 25.2 °C to 31.1 °C
Humidity (winter)	0 -0.5 to 0.5	0.0272	-1.8994	0.4921	Relative humidity 69.8 % 51.4 % to 88.2 %

Velocity	0	0.4214	0.3925	0.5164	Air velocity 0.93 m/s
ASHRAE (summer)	0 (neutral) -0.5 to 0.5	0.2354	-5.7983	0.6854	MR temperature 24.6 °C 22.5 °C to 26.8 °C
Humidity (summer)	0 -0.5 to 0.5	0.0531	-3.2884	0.6198	Relative humidity 61.9 % 52.5 % to 71.3 %
Velocity	0	0.8783	-0.1459	0.5428	Air velocity 0.17 m/s
ASHRAE (all)	0 (neutral) -0.5 to 0.5	0.2402	-6.2045	0.8909	MR temperature 25.8 °C 23.7 °C to 27.9 °C
Humidity (all)	0 -0.5 to 0.5	0.0377	-2.529	0.5476	Relative humidity 67.1 % 53.8 % to 75 %
Velocity	0	0.6189	0.1464	0.4609	Air velocity 0.24 m/s

Comfort zone of this research is compared with international thermal comfort standard of normal people found that in winter is different but in summer and rainy season are consistent with standard values but with higher humidity.



Comfort zone in winter of this research
Comfort zone in summer and rainy season of this research
Comfort zone in all weather conditions of this research
Comfort zone in latitude 16 degrees (Khon Kaen) of Olgyay

Figure 7. Show chart of comfort zone of this study for the blind in clothing insulation at 0.4 clo-value and activity rate at 2.3 met-value. Compared with comfort zone of bioclimatic chart latitude 16 degrees (Khon Kaen)

CONCLUSION

In winter, the blind satisfied with warmer and slightly higher humidity than normal person but in summer and rainy season and all weather conditions they preferred more humid air because of adaptation. Air temperature is higher and humidity is lower than comfort zone. The blind choose to live in semi-outdoor areas most, self-adjustment is easier than adjusting the environment. The satisfaction with weather different from others because of sensibility process.

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AN APPROACH TO DEVELOP AND ADAPT BANGKOK URBAN INFRASTRUCTURE FOR FLOODING FUTURE

THANAKORN SUTHIAPA
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AN APPROACH TO DEVELOP AND ADAPT BANGKOK URBAN INFRASTRUCTURE FOR FLOODING FUTURE.

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INTRODUCTION

There are various effects of the global warming that causes troubles to humanity eg. Extreme events include storm surges, worse tropical storms, more rain, etc. Bangkok is one of the cities that will face extreme events and will later submerge soon while the existing infrastructure system cannot handle the changing of the new global climate. More and more parts of the city continue to submerge because the city infrastructure such as the city canal network is blocked by the water gate system. Each of it section by section, is barricaded whereas the urban drainage system cannot handle the mass of water. Together with the result of less urban green area and other factors, it is necessary to adapt Bangkok infrastructure into a flood resilient city. To adapt to the new global climate, urban planning, building regulation need to update those new factors into the new design guidelines.

This research was produced to study the urban strategies for future development to adapt to new factors such as seawater rise and, extreme weather events through the change of human habitat lifestyle from the existing condition.

Keyword: flood resilient, green infrastructure, extreme events, sea level rises, guideline, regulation.

Thesis question

- what kind of system can be implemented and adapted to the upcoming flooding eras of urban planning to prevent damages from more severe natural disasters such as floods and storm surges?
- how can we implement a new system into building block and/or urban planning with the least effect on the community?
- what is a possible guideline that scan offer beneficial suggestions to the recent problem?

MATERIALS AND METHODS

We have researched related case studies based on World flood prevention urban design and management to study the adaptation of design into each area. Some examples are coastal and urban development areas in the US as well as Thailand. It was proposed on green infrastructure basis on green spaces in city center and linking to other areas by bioswales.

In this research, we used methodological procedures as follows: Step 1: Develop a conceptual framework, practicing and theories. Step 2: Explore case studies. Step 3: Select sites and focus areas for practicing on research. Step 4: Propose and investigate information and comments from the focused group. Step 5: Synthesize information into knowledge to propose guideline/regulations.

Focus area

In this research, the focus areas are selected based on 2 area with different climates. The first is the developmental urban area on river line protection (Khlongsan), and the second is the Coastal area (Bangkhuntien) for the study of coastal extreme event prevention.

From JISTDA, flood frequently interactive map presents the annual flood area in each zone. Sites are set in 3 conditions including Low flood level (30 cm), moderate flood level (50 cm), and high flood (1 meter) for criteria of proposal design.

Each condition is set followed by historical flood height. Start from deep flood followed 2011 Historical flood, average height is around 1 meter, we set as the worst-case scenario for adaptation. The lower flood condition we suggest as frequently flood in each area by divided into 2 scenarios of the low flood (30 cm), medium flood (50cm).

Figure 1. Khlong San area frequently flood map from GISTDA

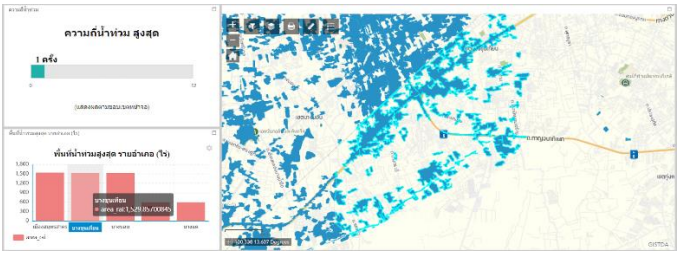

Figure 2. Bangkhuntien area frequently flood map from GISTDA

RESULTS AND DISCUSSION

Urban area (Khlong San)

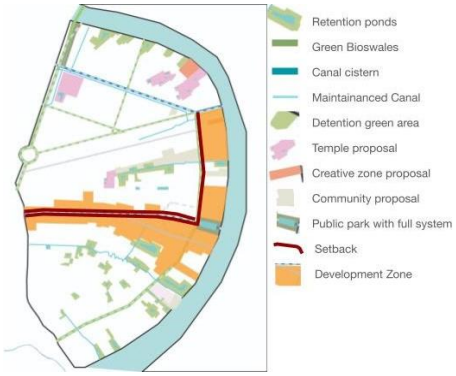

Figure 3. Khlong san area proposal map

Its urban area is divided into 3 levels based on 3 cases of flood level.

Level 1 includes all main roads improved as Bioswales and cisterns that store and provide better surface drainage with permeable surfaces from soft and hardscapes. From the proposal design calculation, the depths of all Bioswales of 3 meters and cisterns are at least 2.5 meters. The result calculates from the length and width of Bioswales and cistern are 484,300 cubic meters which is reach 101% of a low flood situation (462,720 cubic meters). Level 1 (484,300 cubic meters) consists of all empty green areas and public park capacity (438524.5 x 0.5 depth = 219,262.25 cubic meters) with its result is 703,562.25 cubic meters which already reach 91% of a moderate flood (771,200 cubic meters).

Level 2 includes all open space community zones and public zones together with residential areas (585474.5 x 0.3 = 175,642.35 cubic meter). The results combined with level 1 are 879,204.6 cubic meters which are 114% of a moderate flood.

Level 3 includes all development zone setbacks (10 meters width*3 meters deep) combines together with all level results are 1,017,504.6 cubic meters which are reaching 66 % of deep flood capacity (1,542,400 cubic meters). To reach 100 percent, all buildings are required to include a green roof covered the building footprint.

Coastal area (Bangkhuntien)

Figure 4. Bangkhuntien area proposal map

The coastal area is divided into 2 levels.

Level 1 comprises infrastructure including main road from Rama II road connected to Bangkhuntien-Chai Thalae road. All main roads improved as Bioswales that store and provide better surface drainage with permeable surface from soft and hardscape, draining the excess water mass to the ocean by passing the preserved mangrove forest. The capacity from Rama II roads (10 meters width * 3 meters deep) together with Bangkhuntien road (5 meters width*3 meters deep) the results is 1,957,620 cubic meters already reaches 80% capacity of high flood (2,448,000 cubic meter).

Level 2 extends the green infrastructure into residential areas and public building facilities and links to the main green infrastructure.

Level 3 maximum extend green infrastructure into residential growing areas and including existing shop houses and factories to support each other with the main green infrastructure network.

The coastal area needs maintenance on green area which is mangrove forest that helps absorb storm surges from extreme events that occur more frequently.

CONCLUSION

Guideline

Guidelines have been developed from the design proposal on 2 sites arranged into design guidelines for infrastructure in flood eras to prevent damages from climate change.

Urban area

Level 1: infrastructure

All footpaths are necessary to integrate Bioswales, cisterns, and inside water storage, Permeable materials are required in hardscape which work together with vegetation to let water pass into water feeder under the pavement. To work as the main green infrastructure system and connect each green area as a green infrastructure network. Each Bioswale and cistern capacity requires at least 3 meters high for water storage spaces and water feeding water mass to canal and river. All existing green areas and empty land are necessary to be improved as a green supporting area for absorbing rainwater and working as a detention zone to evaporate, delay water mass speed and absorb the rainwater to reduce floods that occurs in the surrounding area by adding perforated pipes and feeder system to send flood water to the public Bioswale. Public parks can be rearranged to support the main flood support system and detention ponds can be added for water storage in the dry season. Specification of flood supporting green area units is required at least 0.3 times in the green area for the adequate volume.

Green area volume = area x 0.3(at least)

The natural barriers (Mangrove Forest) coastal area require maintenance and extend their width to stop the tidal waves and storm surges from extreme events on land and above, including residential, and other urban facilities.

Level 2: Community and culture zone

Community infrastructure. Hardscape and walkway inside community zone are required to rearrange by adding underground water storage inside feed to public Bioswales and link with green area inside community.

Art and culture zone, Rearranging hardscape inside the area can be done by adding underground retention system together with green area for supporting rainwater feed to green infrastructure grid.

Level 3: Development zone

Low rises building zone requires 2 parts. (1) Architecture scale green infrastructure, and (2) green roof for absorbing rainwater and being fed to storage on ground floor space as well as to

public green infrastructure network. Setback and hardscape are required underground bio-retention and permeable hardscape on top for supporting rainwater to link with green area around the zone. High rise Building with large plot of landscape. Existing green space in the area requires implanting the feeders to drain absorbed rainwater into main green infrastructure to drain to river. High rise buildings require green roofs and storage tanks for supporting and recycling rainwater for use in the buildings. The drainage is fed directly into public Bioswales.

Coastal area

Level 1: infrastructure

All main road footpaths are necessary to integrate Bioswales, cisterns, and water storage inside. Permeable materials are required in hardscape and working together with vegetation to let water pass into water feeder under pavement. To working as main green infrastructure system and connect each green area together as network of green infrastructure, each Bioswales and cisterns capacities need at least 3 meters high for water storage spaces and water feeding water mass to river and ocean.

Green area volume = area x 0.3(at least)

The natural barriers (Mangrove Forest) require maintenance and extend their width to stop the tidal waves and storm surges from extreme events on land and above, including residential, and other urban facilities.

Level 2: Community and Facilities

Community infrastructure: land around each community and villages require underground bio-retention for supporting the rainwater and feed to public Bioswales Green area volume = area x 0.3(at least).

Level 3: Development zone

Factory buildings and shophouses can be divided into 2 parts in the following. Architecture scale green infrastructure for absorbing rainwater and feed to storage on ground floor space covered with permeable and feed to public green infrastructure network. Setback and hardscape around require underground bio retention and permeable hardscape on top to support rainwater.

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