APN CAPaBLE Proposal Development

APN Scoping Workshop to Develop an APN Proposal on Capacity Building of Climate Change Adaptation in Urban Planning in the SEA
Jakarta, 6-7 May 2013

Chronology

- 2010: SPG member for Indonesia discussed an initial concept of **summer school in urban planning** to adapt with climate change. The SPG member for Indonesia then brought the idea to the SEA-SRC meeting in Manila in 2010. The SEA-SRC agreed to develop a **CAPaBLE proposal.**
- 2011: APN SEA-SRC pointed the SPG member for Indonesia as the project leader. A proposal was developed and submitted through CAPaBLE. The proposal then went through regular process of review. During the review, three proposals (SEA-SRC, START, Taiwan) were asked to merge.
- 2012: The new combined proposal did not succeed, but the Capacity Development Committee agreed to recommend a seed grant to develop further. The seed grant was provided for scoping workshop. SEA-SRC meeting in Siem Reap, Cambodia agreed to postpone the date from December 2012 to March 2013 (tentative). SEA-SRC ad-hoc meeting in Kobe on April 2013 agreed the date of the scoping workshop would be 6-7 May 2013 in Jakarta.

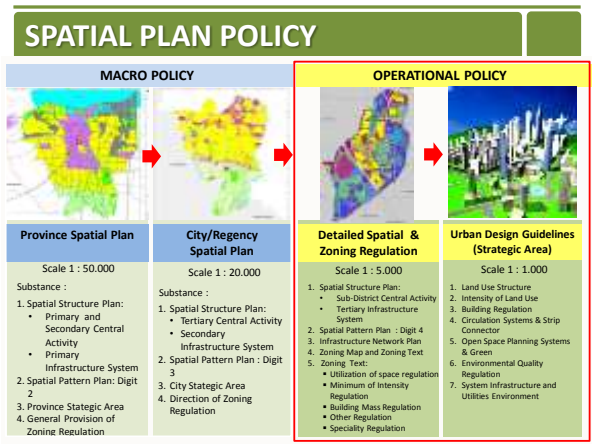
Materials for Proposal Development

1. Original CAPaBLE Proposal by the SEA-SRC
2. Questions to the proposal (raised by reviewers)
3. APN's regulations on finance and data sharing
4. FAQs and advice on developing proposals
5. Presentations
6. Others

Actions

- Define the scope of proposed project and output
- Type of activities → summer school
- Define the target groups
- Period (1 year or multi-years)
- Answering the questions as guidance
- PI and collaborators
- Contribution from each country
- Seeking any national and/or international organisations to involve
- Improve the rationale, methodology, literature
- Define the resource persons
- Define the mode of operation

SPATIAL PLAN POLICY



STRATEGIC ISSUES OF SPATIAL PLANNING
JAKARTA PROVINCE

- Traffic Jam
- Flood Management
- Open Space
- Climate Change
- Increase in Energy Consumption
- Changes in The Economy and World Financial
- Population and Social Problems
- Limited Clean Water Supply, Liquid Waste Management and Waste Management
- Disaster Mitigation Preparedness
- Limited Development Funding

PERDA NO.1/2012
JAKARTA PROVINCE SPATIAL PLAN 2030

PRINCIPLES OF JAKARTA PROVINCE SPATIAL PLAN 2030

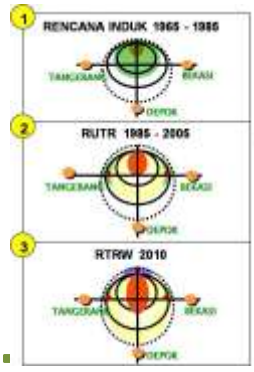
1. **Growth Management.**
2. Functional Basis of Planning is **Megalopolitan Jabodetabekpunjur.**
3. Transformation from Stakeholders to Shareholders.



VISION DAN MISSION

VISION	**Jakarta as the capital of the Unitary State of the Republic of Indonesia that comfortable, sustainable and populated by prorperous community**
MISSION	• build humanity **infrastructure**; • optimize the **productivity of city**; • developing **urban culture;** • mainstreaming **disaster mitigation** based development; • creating a **prosperous and dinamic** city life**;** • harmonize urban life with the **environment**;

SPATIAL PLANNING STRATEGY SCHEME



JAKARTA PROVINCE SPATIAL PLAN 2030 RELATED TO CLIMATE CHANGE

Policy :

- Increasing Open Green Space to reach 30% from land area
- Reduction of greenhouse gas emissions for anticipation of global warming and climate change
- Increased adaptation and mitigation against the threat of global warming and climate change and risk of other disasters

Strategy :

- Apply green building and sustainable urban design
- Improve the quantity and quality of green space and maintain availability of existing green space
- Direct utilization of vulnerable disaster area for cultivation activities that have a high adaptability;
- Reduce disaster risk through rearrangement and application of technology or engineering in the affected areas
- Develop The North Coast Region (Pantura) as an effort to anticipate climate change
- Increase the provision of open blue space to anticipate the increase of rainfall intensity

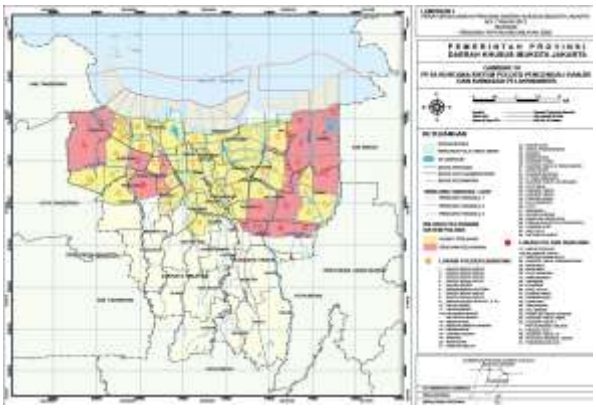
SPATIAL STRUCTURE PLAN

SPATIAL STRUCTURE PLAN

Spatial Structure Plan consist of:

- **Central Activity** System; consist of Primary and Secondary Central Activity, an area that has:
  - governmental function;
  - office, commerce and services function;
  - industrial and warehousing function;
  - social and cultural function;
  - mass transport transit function; and
  - several function.
- **Transportation** system and network;
- **Water resources** system; and
- **Urban utilities** system and network.

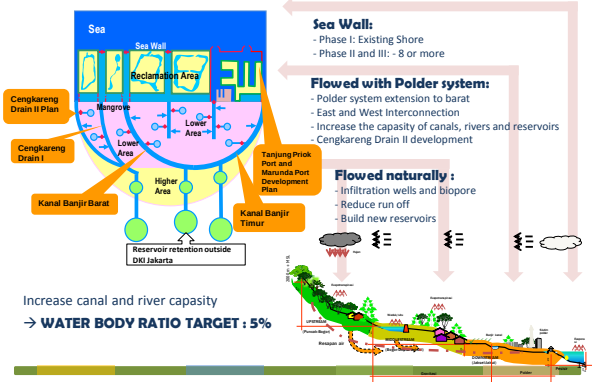
SPATIAL STRUCTURE PLAN MAP



WATER RESOURCES SYSTEM - POLDER SYSTEM MAP

WATER RESOURCES SYSTEM - RESERVOIR DISTRIBUTION MAP

FLOOD MANAGEMENT



CONSTRUCTION STAGES OF GIANT SEAWALL

Short Term	Mid Term	Long Term
		
Stage 1 (2011-2015) Function: coastal protection	**Stage 2 (2015-2025)** Function: Integrated development with reclamation area	**Stage 3 (2025-2030)** Multi purpose seawall construction for Jakarta Bay

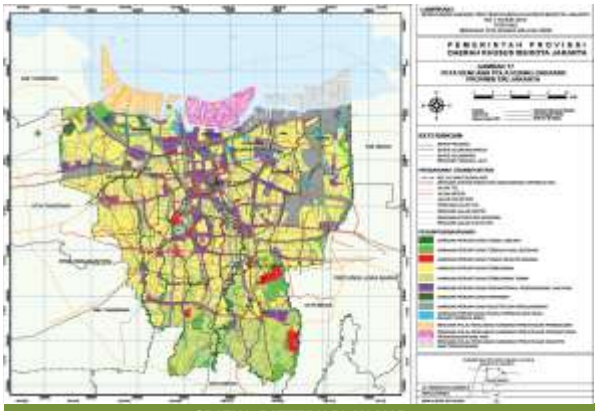
SPATIAL PATTERN PLAN

SPATIAL PATTERN PLAN

- **Spatial Pattern Plan,** consist of:
  - space allocation for conservation; and
  - space allocation for cultivation.

- space allocation for **conservation,** consist of :
  - subordinate pprotection area
  - local protected area;
  - preserve area;
  - conservation area;
  - cultural heritage area; dan
  - vulnerable disaster area

- space allocation for **cultivation,** consist of :
  - open green space area
  - green settlement area
  - settlement area
  - office, trade and services area
  - the function of the State Capital area
  - Industrial and warehousing area
  - open non-green space area
  - tourism area
  - specialised area
  - strategic area
  - disaster evacuation area
  - Informal sector activity area



SPATIAL PATTERN PLAN MAP

OPEN SPACES

Increasing Open Green Space to reach 30%

(20% Public Open Green Space + 10% Privat Open Green Space)

Open Green Space target will be pursued through :

- **Private land** that serves as an open space such as sports facilities (golf lap. etc) and recreational facilities
- Stimulate **community participation** in development and maintenance Open Green Space in their properties
- **Acquisition for Public open Green Space** gradually
- **Responsibility** from developers to provide public facilities

OPEN SPACE PLAN MAP

DETAILED SPATIAL PLAN

OBJECTIVE AND FUNCTION

OBJECTIVE of Detailed Spatial Plan and Zoning Regulation

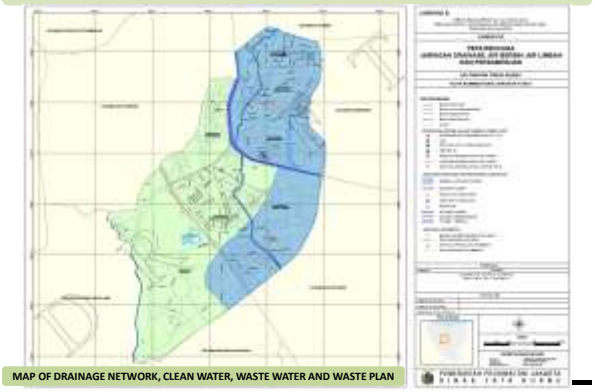
a. realization of **value and quality** of space
b. realization of spatial management administration;
c. realization of spatial regioan that provides **productive and innovative** quality of urban life;
d. realization of Jakarta with a water system that can **reduce flood**;
e. realization of Jakarta with well transportation to **reduce gridlock**; dan
f. realization of **open green space** accordance to the prevailing regulation.

FUNCTION of Detailed Spatial Plan and Zoning Regulation

a.to support actualization of space utilization;
b.maintain **consistency and harmony** development of functional area;
c.creating **linkages** between program development;
d.as a **device to control** over space utilization;
e.as a reference **incentives and disincentives**;
f.as the basis for **sanction imposition**;
g.as a guide for **space utilization activities**; dan
h.as a technical guide in **licensing space utilization** .

INFRASTRUCTURE NETWORK PLAN

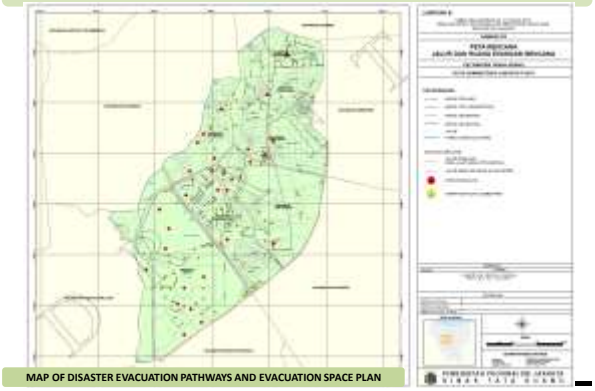
SAMPLE : **TANAH ABANG** SUBDISRTRICT



MAP OF DRAINAGE NETWORK, CLEAN WATER, WASTE WATER AND WASTE PLAN

DISASTER EVACUATION PATHWAYS AND EVACUATION SPACE PLAN

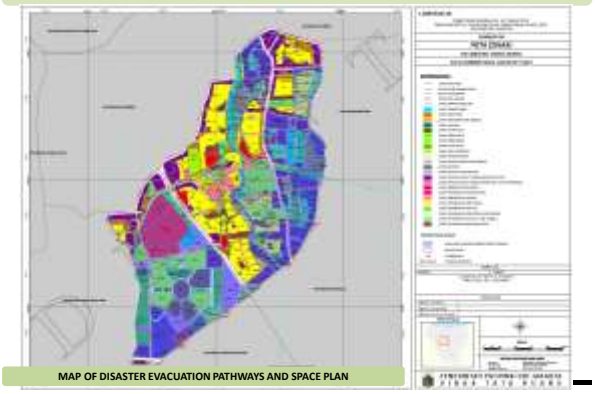
SAMPLE : **TANAH ABANG** SUBDISRTRICT



MAP OF DISASTER EVACUATION PATHWAYS AND EVACUATION SPACE PLAN

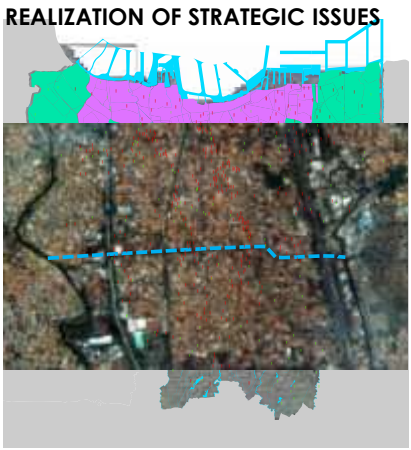
ZONING MAP

SAMPLE : **TANAH ABANG** SUBDISRTRICT



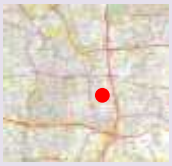
MAP OF DISASTER EVACUATION PATHWAYS AND SPACE PLAN

REALIZATION OF STRATEGIC ISSUES

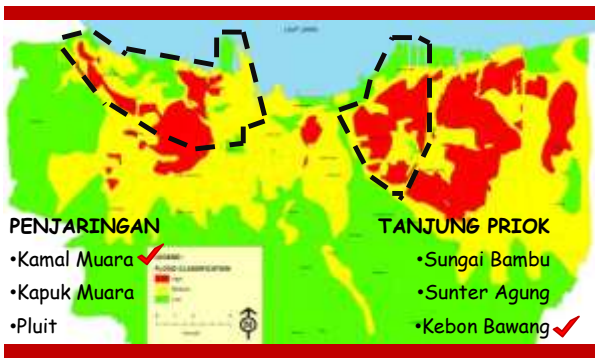


FLOOD CONTROL PLAN

- FLOOD LOCATION
- EXISTING WATER PUMP
- EXISTING POLDER SERVICE AREA
- POLDER SERVICE PLAN
- CILIWUNG CANAL PLAN



AREA OF INTEREST



DATA POTENSI DESA JAKARTA UTARA TAHUN 2011

	KELURAHAN	NUMBERS OF SETTELEMENTS FOUND ALONG THE RIVER	NUMBERS OF HOUSEHOLD FOUND ALONG THE RIVER	NUMBER OF SLUMS AREA	NUMBER OF HOUSEHOLD IN THE SLUMS AREA
PENJARINGAN	**Kamal muara**	.	.	**1**	**96**
	Kapuk muara	.	.	2	520
	Pejagalan	.	.	3	517
	Penjaringan	1	1016	3	693
	Pluit	.	.	.	.
TANJUNG PRIOK	Sunter agung	2	375	7	2286
	Sunter jaya	.	.	8	2510
	Papango	1	83	2	828
	Warakas	1	84	5	1286
	Sungai bambu	1	208	5	728
	Kebon bawang	**3**	**368**	**8**	**1481**
	Tanjung priuk	2	126	4	133

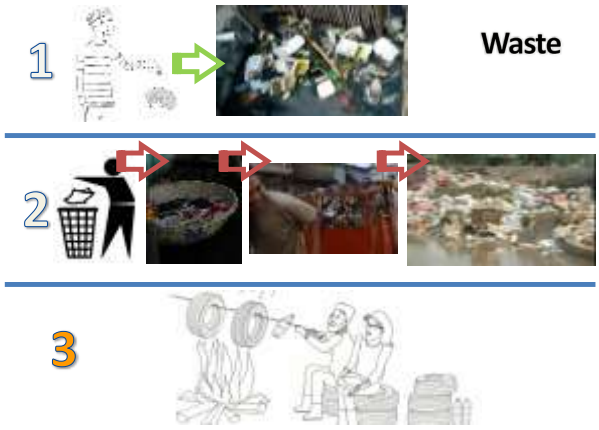
Site Selection

Figure Ground

FLOOD PLAIN ZONE

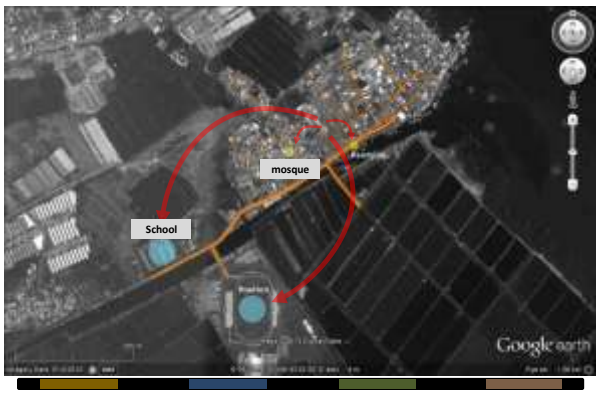

Water Resource
Water well pump
Department of Public Work
provides clean water


MCK
Public Toilet
Privat Toilet
No septic tank


1
Waste
2
3

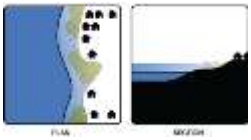

Economic Activity

Evacuation Space

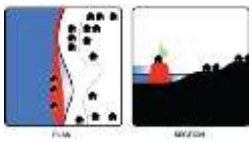


Alternative Design

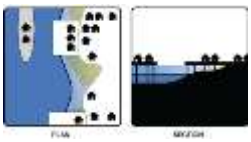
Retreat?



Defend?



Attack?

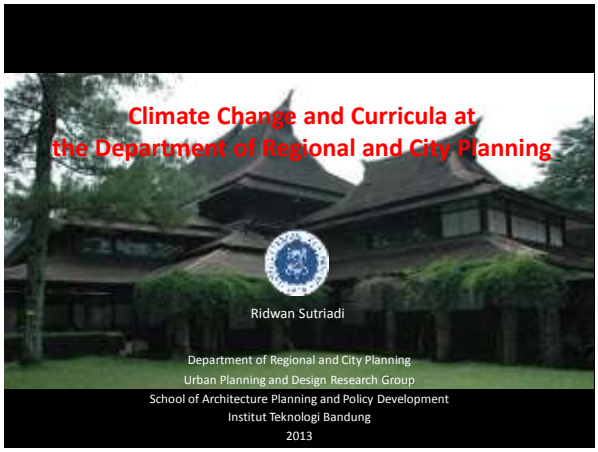


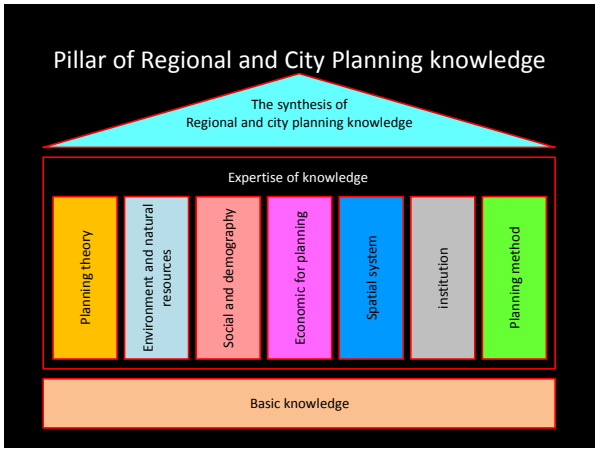
'living with water':

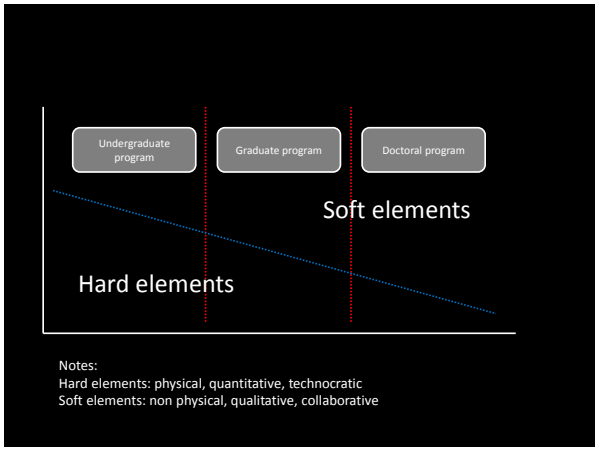
past experience in the traditional architecture could live close to the water

'...the good news is that vernacular architecture somewhere in the world is probably already designed to cope with the extremes of climate we will face – whether flooding, drought or high winds. We can learn from these precedents.' (RIBA, 2007)

TERIMA KASIH

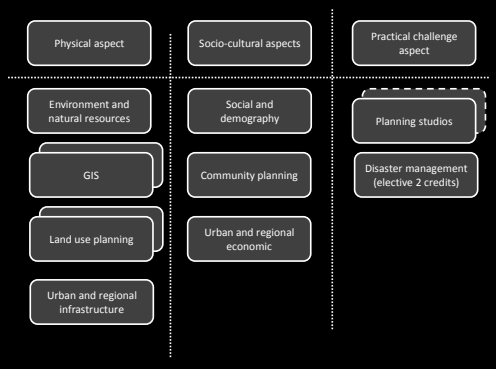

Climate Change and Curricula at
the Department of Regional and City Planning
Ridwan Sutriadi
Department of Regional and City Planning
Urban Planning and Design Research Group
School of Architecture Planning and Policy Development
Institut Teknologi Bandung
2013


Pillar of Regional and City Planning knowledge
The synthesis of
Regional and city planning knowledge
Expertise of knowledge
Planning theory
Environment and natural resources
Social and demography
Economic for planning
Spatial system
institution
Planning method
Basic knowledge

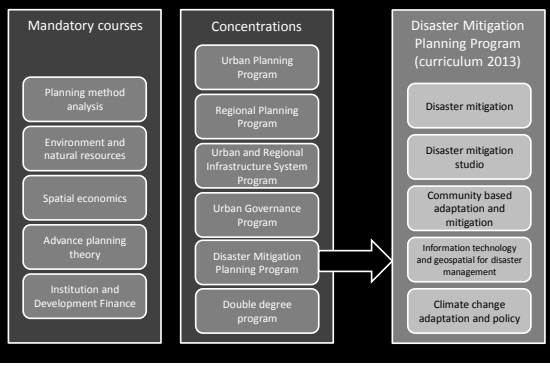

Undergraduate program
Graduate program
Doctoral program
Soft elements
Hard elements
Notes:
Hard elements: physical, quantitative, technocratic
Soft elements: non physical, qualitative, collaborative


Global Challenge of Regional and City Planning
Global Challenge
Global competition
Global crisis of economic and cultural
Global climate change
Global political change
National Challenge
Socio economic:
Market force; socio-economic disparity; poverty
The dynamic of development:
Primate city; isolated; deficiency and inefficiency of infrastructures
Environment :
Natural environmental quality; men made environmental quality; disaster
Institution, financing and politic:
Democratization, insufficient development funding, in conducive socio-economic condition
Food and Energy Securities

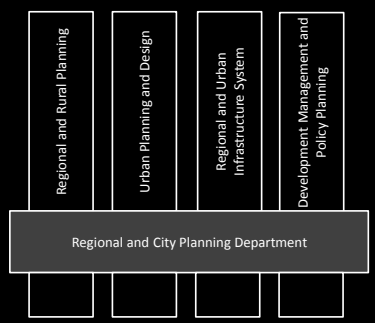
Climate Change and the Undergraduate Program



Magister Program

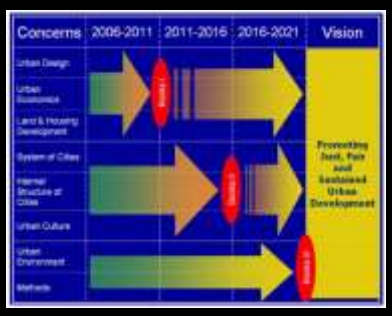


Research Strength



Research Group of Urban Planning and Design:

Promoting just, fair and sustained urban development



Research Group of Regional and Urban Infrastructure System

connecting people and urban space through sustainable development

THEME	SUB THEME	2009	2010	2011	2012
Development of procedure, theory, method, and analytical technique	• Development of Land-use-Transport Interactive Model • Development of the Application of Transportation Analytical Model • Development of Infrastructure Information System based on GIS Technology	•	•	•	
Infrastructure System and Sustainable Regional Development	• Infrastructure Management in metropolitan, urban and rural, marine and maritime, islands and coastal area, isolated areas • Infrastructure Development and Environmental Preservation	•	•	•	
Institutional Development and Infrastructure Development Financing	• Assessment of Interregional cooperation • Financing scheme • Regional Disparity • Central and Regional Relationship • Infrastructure Impact			•	•
Development of access to Infrastructure Services	• Supply satisfiability • Community capability • Infrastructure Provision Indicator			•	•

Research Group of Development Management and Policy Planning

Better urban governance in the context of regional autonomy

Research Group of Regional and Rural Planning

The synergy among environmental planning and management, regional policies and governance, rural transformation and community development

No.	Issue	Subtheme
1	*Environmental planning and management*	*Disaster management*
		Climate Change and regional development
		Riverbasin management
		Ecotourism development
		Coastal and marine development
2	*Regional policies dan governance*	*Regional economics*
		Local economic development
		Megaurban and periurban development
3	*Rural Transformation and Community Development*	*Indigenous development*
		Rural development and planning
		Community development

The Challenge for CAPABLE Actions

Define the scope of proposed project and output

- To promote educational activities
- To promote research (academic/action)
- To promote community service

The Challenge for CAPABLE Actions

Type of activities

- TOT and faculty exchange
- Accommodating CC concern to the planning studio (especially master program)
- To develop research based activities
  - To develop basic research that have been done by related research group (international cooperation type)
  - To enrich related curriculum by adding CC material
  - To incorporate the planning studio project with the CC concern
- To develop serial CC training
  - Define personnel
  - Define target group
  - Define CC's material focus.

The Challenge for CAPABLE Actions

Define the target group

- DRCP has ongoing functional planning training and thematic training (including CC training) incorporation between DRCP and Bappenas (Pusbindiklatren) with the target group local government employees.
- Some planning faculties do have teaching material related to CC.
- DRCP (SAPPD) has ongoing summer program with international universities partners
  - Community based environmental awareness (Bali Field School, 2009, with UF)
  - Promoting community based planning and design (Sawahlunto, 2012, with UF)
  - Cultural aspects and planning design (Yogyakarta, 2013).
- Professional association (such as Indonesian Association of Planner)

The Challenge for CAPABLE Actions

Period

- Annual (summer program)
- Every semester
- Based on demand

The Challenge for CAPABLE Actions

Answering the questions as guidance

- Planning and management based
  - CC and current planning policy (national/province/ regency-city level/local level)
  - The position of CC based action plan (Planning process phase/planning implementation phase/ planning control phase)
- Capacity building based
  - Capacity building for governmental employees/particular stakeholders (NGO/CBO/young generation)
  - Out of the box: civic engagement and communicative channel (voluntary planning activities; community based monitoring) to respond uncertainties (values/environment/related decision making process)

The Challenge for CAPABLE Actions

PI and collaborators

- ITB, SAPPD and DRCP does have persons who deal with international cooperation
- DRCP does have CC related research throughout research group:
  - CC mitigation and adaptation (regional and rural planning RG).
  - CC and infrastructure quality and preparedness (urban and regional infrastructure system RG)
  - CC and livability/green development for all (urban planning and design RG)
  - CC and civic engagement model (Development Management and Policy Planning RG).
- DRCP working together with professional association (IAP) towards CC concern
- DRCP as a hub to promote CC concern throughout private urban planning school in Indonesia

The Challenge for CAPABLE Actions

Contribution from each countries

- Providing trainers
- Providing case studies (including cooperation with local government as hosts)
- Providing related CC research that have been done as entry points for CAPABLE actions

The Challenge for CAPABLE Actions

Seeking any national/international organizations to involve

- To encourage CC based activities among international university's partners
- To identify national/international organizations that have the similar program.

The Challenge for CAPABLE Actions

Improve the rationale, methodology, literature

- International approach?
- Local wisdom approach?
- Technological based approach?

The Challenge for CAPABLE Actions

Define the resource persons

- Persons/faculties/research assistants that have interest in CC.
- Decision maker in international/national/local level

The Challenge for CAPABLE Actions

Define the mode of operation

- Developing teaching material based on existing teaching material and accommodating raising issues.
- The expected impact of post CC training

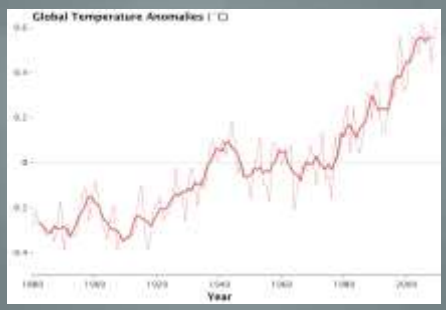
Climate Adaptation Action Strategies for Coastal Cities

Kem Lowry, PhD
Adjunct Senior Fellow
East-West Center

Urban Climate Change Certainties

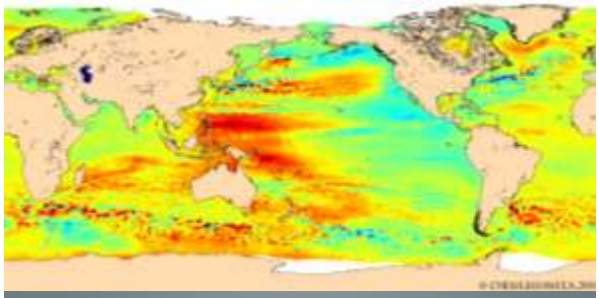
- Global climate change is real.
- Global temperatures will continue to increase even if major reductions in greenhouse gas emissions are substantially reduced.
- Climate change will increase the frequency of some natural hazards, especially extreme weather events.
- Climate change will have disproportionate negative impacts on the urban poor and residents of informal settlements.
- Building urban resilience to the impacts of climate change will be an on-going process of planning, managing, monitoring and adaptation.

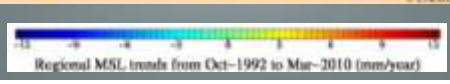
2010 – Tied as warmest year
1.34°F (0.8°C) total warming



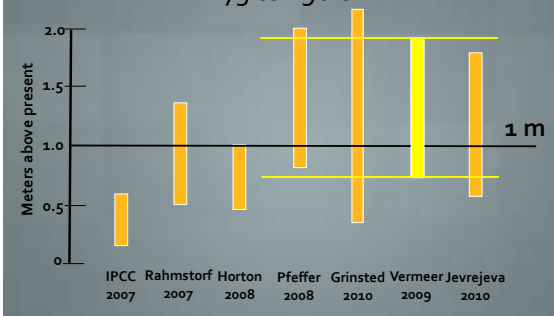
Chip Fletcher, University of Hawaii at Manoa
School of Ocean and Earth Science and Technology,

Satellite Altimetry – 3.27mm/yr





Sea level Estimates – 2100
75 to 190 cm

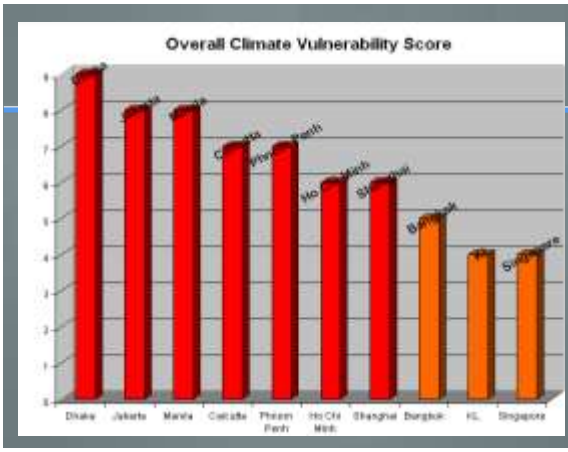


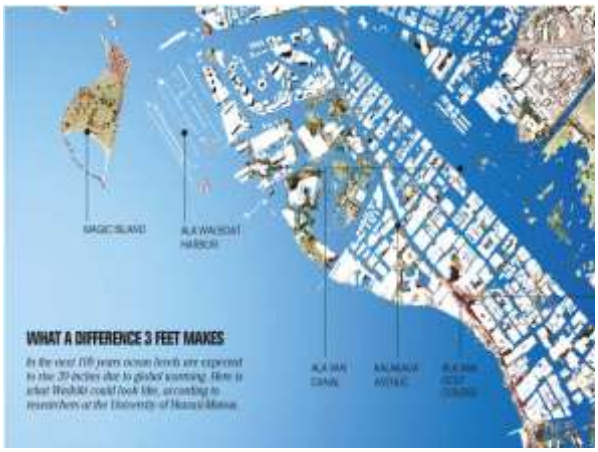
Urban Climate Change Uncertainties

- Response of climate system to global greenhouse emissions
- Scale and scope of climate impacts across regions and at the local level
- Response of ecosystems—and flow of ecosystem services
- How climate change will interact with other physical, hydrological and other systems
- What combination of management interventions will be most cost-effective in reducing adverse impacts?

SE Asian Urban Contexts

- More than 80% of GDP generated in urban areas
- Economic opportunities attract urban migrants
- In 2008 more than 45% of people live in urban areas; 56% by 2030
- 28% of SE Asian urban residents live in slums and squatter settlements, often in flood prone areas
- Urban poor are most vulnerable to climate change impacts





Designing a Local Adaptation Strategy

- Assess vulnerabilities
- Identify management options
- Select management tools
- Implement management tools
- Ongoing monitoring, evaluation and adaptation

Risk Assessment

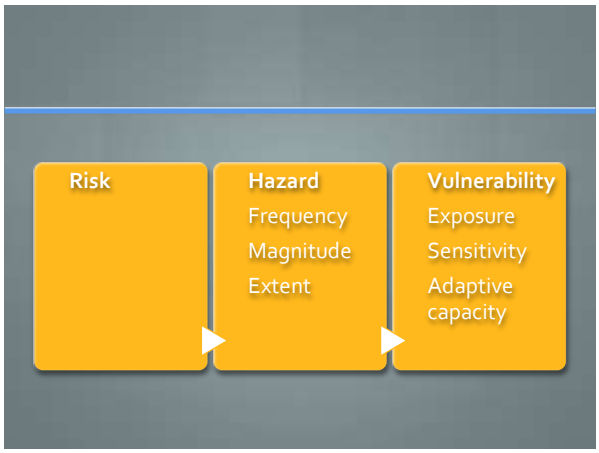
- What hazards will climate change cause or contribute to?
- How serious are hazards likely to be?
- What research/analysis is needed?
- Where should planners and policy makers focus their adaptation efforts?

Urban Planning Challenges

- Identifying and assessing urban [and rural] vulnerabilities to climate change [combining technical analysis and community meetings and workshops]
- Educating policy-makers and communities about short and long term impacts of climate change
- Identifying management tools to address impacts [flood-proofing areas, hazard zones, etc.]
- Evaluating options including costs
- Identifying and addressing implementation barriers.

The Concept of Climate Change Risk

Elements of Vulnerability



Elements of Vulnerability

- Sensitivity—how susceptible are structures, individuals and the environment to hazard impacts
- Exposure—what is in harm's way—people, structures, infrastructure and environmental assets that could be affected by a hazard
- Ability to cope—community resiliency which includes hazard awareness, hazard planning, identifying evacuation routes, placing shelters in non-exposed areas, pre-placing emergency supplies, etc.

How Sensitive Are Community Assets to Hazard Impacts

Structural Sensitivity

Areas Exposed to Potential Hazards

Providing Food & Water as Post-Flood Adaptive Capacity

Adaptive Capacity takes Multiple Forms

Assessing Climate Vulnerabilities

- Top-down approach: Focus on long-term impacts of sea level rise and other change drivers, develop predictive models and technical studies, design long-term, multi-agency strategies
- Bottom up: Focus on key short-term impacts for which data are readily available, involve communities and local organizations in designing and evaluating interventions, build management around existing management tools.

Hawaii's Approaches to Adaptation to Sea Level Rise

- Recognize adaptation may have to occur in phases.
- Focus on a few key climate change issues, particularly sea level rise
- Build on historic and current technical analysis on rates of change and climate variability, exposure and sensitivity
- Educate elected officials and communities
- Design adaptations to existing laws and programs to address impacts of sea level rise

Estimates of Sea Level Rise in Hawaii

- .24 m by 2050; 1m by 2100
- Erosion multiplier of 150 [according to State of Hawaii Multi-Hazard Mitigation Plan, 2007]
- Hence, .24 m increase results in beach retreat of 36 m.

Impacts of Sea Level Rise Over Next 10-15 Years

- Increased each erosion and retreat
- Increased flooding in coastal areas
- Reduced access to shoreline attractions
- Increased flooding threats to key infrastructure including roads, sewers, storm drains, electrical lines
- Threats to freshwater aquifers

Kailua Beach Erosion

Kailua Beach Erosion

Analysis of Coastal Erosion Exposure

- 50 year history of beach erosion for all coastal segments in the state
- Detailed studies of a few urban beaches subject to erosion

Analysis of Sensitivity

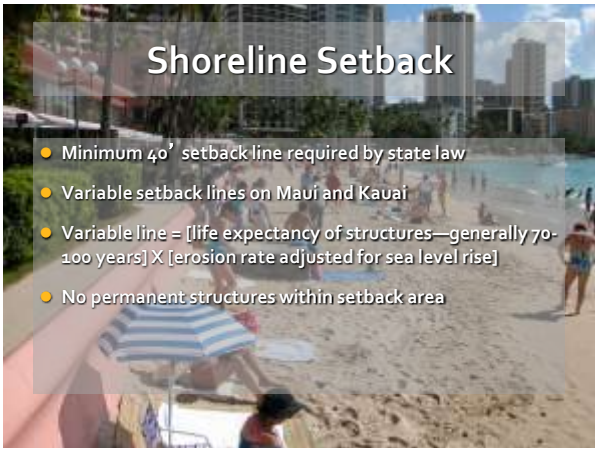
- Identification of rapidly-eroding beaches
- Identification of illegal seawalls
- Identification of seawalls being undermined

Seawalls Affect Sand Transport

Hawaii Coastal Setback Issue

Increasing Adaptive Capacity to Erosion

- Revising Shoreline Setback laws administered by local governments—now using setbacks ranging from a minimum of 20' to maximum of 40'
- Developing variable setback laws to increase "no build" areas subject to erosion [e.g. 40' plus 70' times the annual coastal erosion rate]
- Improved enforcement of setbacks, restrictions on sea walls, etc.
- Improved education of builders, homeowners and local officials about need for increased setbacks.



Barriers to Climate Change Adaptation

- Institutional capacity and inertia
- Lack of agreement about degree/immediacy of climate threats
- Perceived threats to property rights
- Potentially high public/private costs of adaptation—and allocation of costs
- Lack of agreement about effectiveness, fairness and legitimacy of specific intervention strategies

Types of Climate Change Technical Uncertainties

- Responses of climate system to global greenhouse emissions
- Frequency, intensity, spatial extent, and timing of extreme weather and climate events
- Intermediate and long-term changes in climatic conditions in Hawaii and the central Pacific
- Timing and extent of sea level rise—and impacts on water table and quality in near-shore areas.

Reducing Technical Uncertainties

- More international and national refinement of climate change models.
- Refinement of models for assessing frequency, intensity, spatial extent and timing of extreme climate events.
- Increased local research focus on possible short and long-term impacts of climate change generally and extreme events in particular.
- Research on "cascading' impacts of specific climate change events such as extended droughts or severe flooding.

Reducing Political Uncertainties

- Recognize that technical research is unlikely to provide certainty regarding the types, timing and magnitude of climate change events.
- Engage communities in analysis of future climate change scenarios and their potential impacts.
- Focus greater research and management attention on chronic risk factors [e.g. coastal erosion and flooding].
- Develop short and longer term vulnerability assessments
- Develop adaptive management strategies that build resilience over time.

Identifying Possible Adaptation Tools Under Conditions of Uncertainty

- Focus management on well-documented current and anticipated issues [e.g. coastal erosion, flooding]
- Build on existing institutional arrangements [local "best fit" rather than "best practice" from someplace else]
- Continually monitor and evaluate management efforts to insure validity
- Continue research on long term climate change and impacts
- Engage communities in climate change vulnerability assessments as part of "normal" planning and management

Types of Adaptation Strategies Under Conditions of Uncertainty

- "No regrets" strategies
- Flexible, reversible strategies
- Adjustments to safety standards
- Anticipatory strategies

"No Regrets" Climate Adaptation Strategies

- Management strategies that address current problems---- and are beneficial even if impacts of climate change are less severe than anticipated.
- Hawaii examples include variable shoreline setbacks to address worsening coastal erosion problems or updated flood maps and regulations

Flexible, Reversible Adaptation Strategies

- Strategies that address current or probable impacts, but can be easily updated or modified based on improved information. Costs of being wrong are relatively low.
- Reversible strategies might include more stringent building codes in updated hazard zones, higher insurance rates based on estimates of more frequent flooding, new climate hazard assessment requirements.

"Safety Margin" Strategies

- Focus on changes in infrastructure standards to increase their resilience or capacity
- For example, reduce risk of coastal flooding by means of changes in capacity standards for drainage infrastructure, increasing the size or strength of dikes around key infrastructure.
- Best done in the design phase rather than try to retrofit existing infrastructure.

"Anticipatory Strategies"

- Augment conventional planning with requirements for additional long-term planning horizons for specific sectors such as infrastructure, energy, water and agriculture
- Engage in long term "scenario planning" with communities using different sea-level rise inundation estimates.

Concluding Observations

- Climate change is real, but its impacts are not obvious to many of those whose support will be required to enact comprehensive climate adaptation strategies.
- We can reduce technical and political uncertainty associated with climate change by initiating an adaptation program that focuses on known climate-related risks such as coastal erosion and flooding.
- Rather that importing "best management practices" we can emphasize "best fit" by adapting existing institutions to climate change adaptation purposes.

Concluding Observations

- Using management strategies including "no regrets," reversible planning strategies and modified safety standards allows us to adapt, implement, and evaluate exiting management efforts—and minimize technical and political uncertainty.
- An emphasis on an adaptive approach to climate change requires a great deal of additional research on multiple aspects of climate change, community vulnerabilities to the impacts of climate change and on the effectiveness of specific management strategies.

Flooded Highway

Sea Level Rise as a Governance Issue

- What are formal institutions for managing climate change impacts including sea level rise? How adequate?
- What are informal institutions? How adequate?
- At what scales should institutional adaptation occur [household? Neighborhood? Metropolitan? State?]
- What types of coordination strategies across institutions, scales and time are likely to be effective?

LAND USE / LAND COVER CHANGE (LULCC) AND URBAN HEAT ISLAND (UHI)

[1) 2)] Laras Tursilowati, [1)] Erna Sri Adiningsih,
[2)] Josaphat Tetuko Sri Sumantyo, [2)] Hiroaki Kuze,
[1)] LAPAN-Indonesia, [2)] CEReS-Chiba University-Japan
laras@bdg.lapan.go.id, laras_lapan@yahoo.com

The APN Scoping Workshop on Capacity Development of Climate Change Adaptation in Urban Planning
Hotel Grand Cempaka, Jakarta, Indonesia
6th to 7th May 2013

1

Problems: Urbanization Issues
Global, Regional & Local Problems

- Nearly 300 cities have a million or more inhabitants
- 4th assessment Report of IPCC: level of urban warming uncertainty: 0.006°C per decade since 1900 for land, and 0.002°C per decade since 1900 for blended land with ocean

2

Impacts of urbanization (Land Use and Land Cover Change/LULCC)

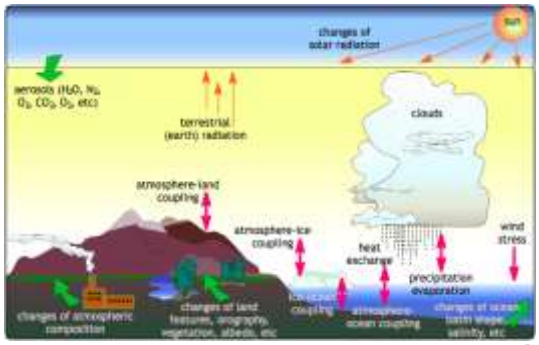
- Urban heat island (UHI)
- Boundary layer structures
- Deformation of synoptic system
- Formation of convergence zone and thunderstorm.
- Air quality
- Human health
- Damage to agriculture and ecosystems
- Water and energy supply/demand
- Climate (ozone and aerosol, greenhouse radiation budget)

3

URBAN CLIMATE CONTROLLER
(Sebastian Wypych)

4

The Climate System



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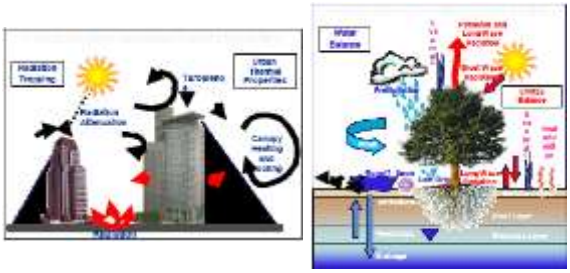
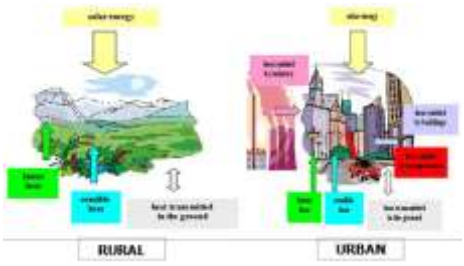
Effect of Building and Trees to Radiation & Water Balance



6

ILLUSTRATION OF HEAT FLUX COMPONENT IN RURAL AND URBAN

(Wypych, et al., 2003)



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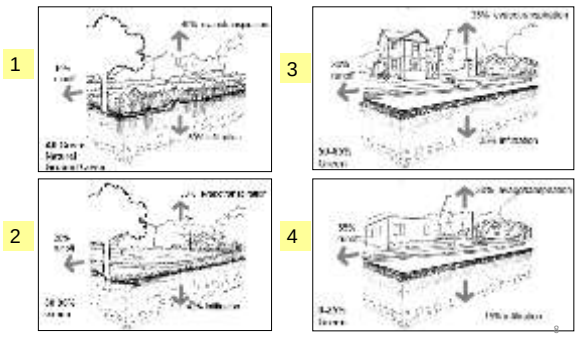
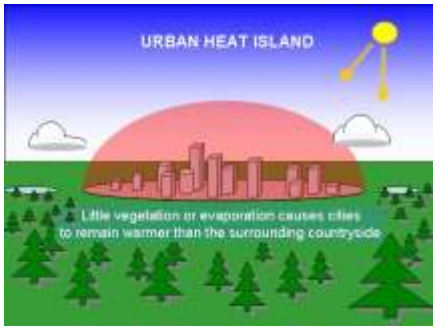
Relation of Green Space and Runoff



URBAN HEAT ISLAND (UHI)



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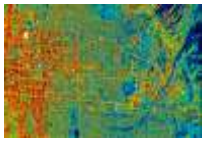
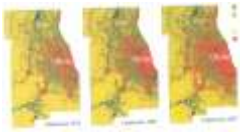
Urban Heat Island Phenomenon in the big cities

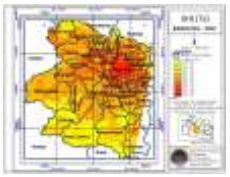
Atlanta & Salt Lake City



Chicago

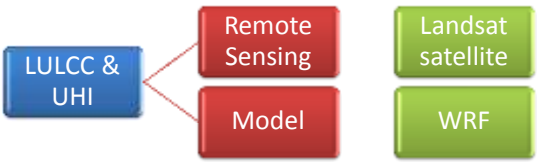


Bandung, Indonesia



10

Monitoring & Scenario of LULCC and UHI



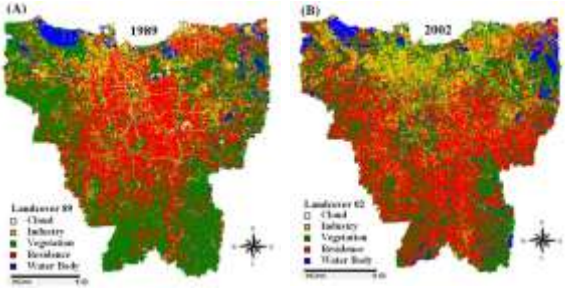
11

Result & analysis

12

Relationship between UHI and Land cover using Landsat Satellite

Spatial map of land cover classification in Jakarta **(A)** 1989 and **(B)** 2002



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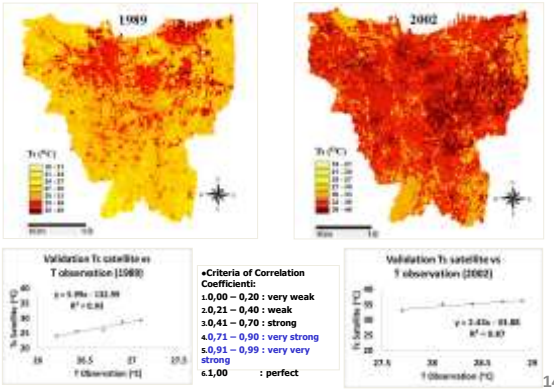
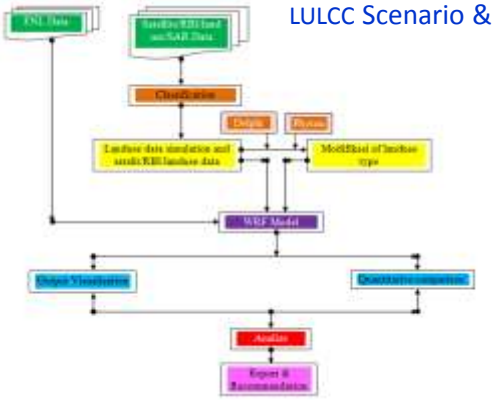
URBAN HEAT ISLAND in Jakarta from Landsat satellite estimation



14

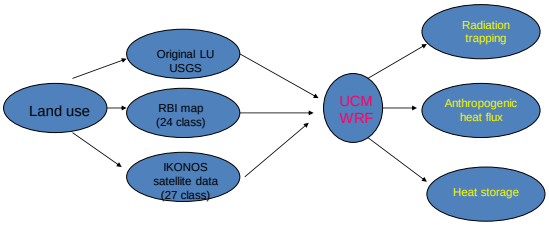
Methodology of LULCC Scenario & UHI



15

PC Cluster, LAPAN-Bandung

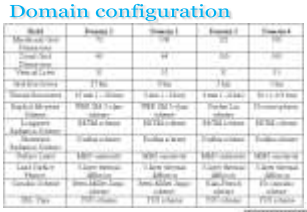
Scheme of UCM (Urban Climate Model)



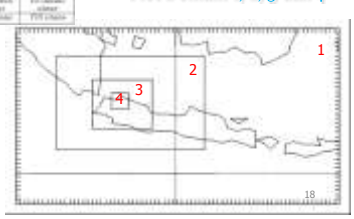
17

Urban Climate Modeling using Weather Research Forecasting (WRF) model

Domain configuration



Plot Domain 1, 2, 3 dan 4

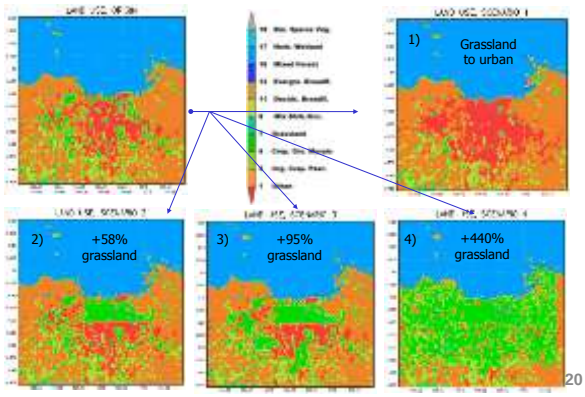


18

RUNNING RESULT OF WRF MODEL 80 VARIABLES

19

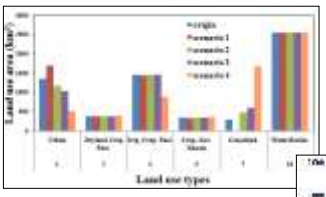
Modification/Scenario of Landuse runs in Weather Research Forecast (WRF) model



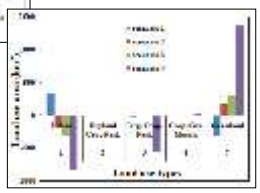
20

Statistical Analysis of Landuse

Land use before and after modification (km²)



Land use changes of LU after modification (km²)



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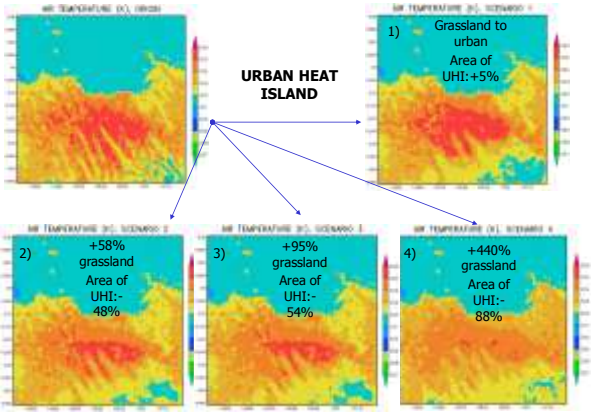
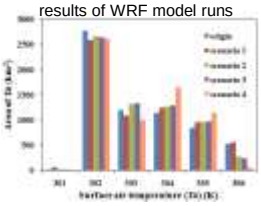


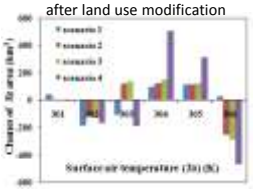
22

Statistical analysis of Air Temperature (Ta or T2m)

Distributions of *Ta* from the results of WRF model runs



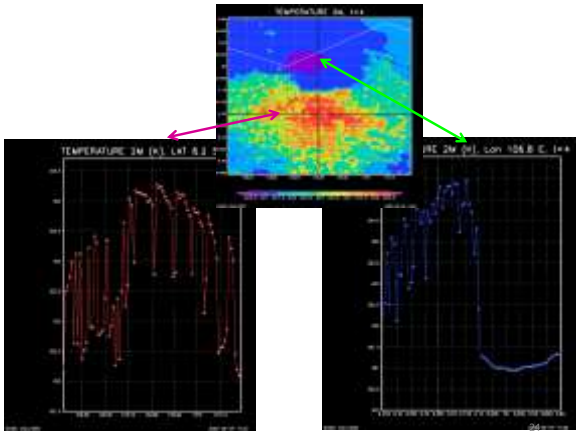
The changes of *Ta* area after land use modification



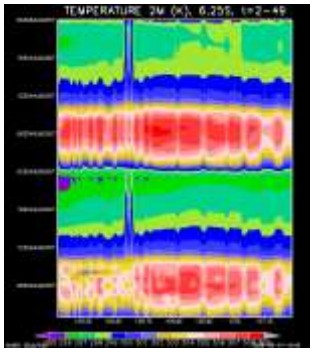
Ta (K)	scenario 1	scenario 2	scenario 3	scenario 4
301	226%	47%	16%	5%
302	-7%	-4%	-5%	-6%
303	-9%	10%	11%	-16%
304	9%	11%	13%	44%
305	14%	14%	15%	37%
306	5%	-48%	-54%	-88%

Changes of *Ta* area from origin in percentage

23



Air Temperature for 48 hours WRF Model runs



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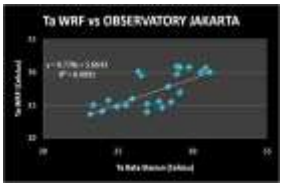
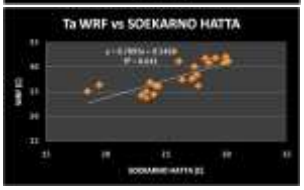
MODEL VALIDATION





Criteria of Correlation Coefficienti:
1.0,00 – 0,20 : very weak
2.0,21 – 0,40 : weak
3.0,41 – 0,70 : strong
4.0,71 – 0,90 : very strong
5.0,91 – 0,99 : very very strong
6.1,00 : perfect

26

CONCLUSION

- ✓ The relationship between Urban Heat Island (UHI) and land cover type has been studied comprehensively by remote sensing and GIS.
- ✓ UHI is found to be centralized in downtown areas and spreading to the surrounding area.
- ✓ LU modification from grassland to urban (scenario 1) will expand area of UHI with highest temperature (Ta 306K (33^0C) by 5%). In the contrary with the addition of grassland /vegetation (scenario 2, 3 and 4) would reduce the area with high temperature (by -48%, -54% and -88% respectively).
- ✓ This study can be used as reference for good urban design and comfortable environment.

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Future Plan & Recommendation

- ➢ Explore to analyse the other climate variables [Albedo, Radiation balance (Net Radiation, Latent heat flux, Surface Heat Flux, Sensible Heat Flux), Planetary Boundary Layer Height (PBLH), Accumulated Total Precitipitation Cumulus, Outgoing Longwave Radiation (OLR), etc.]
- ➢ Modification of the other type of urban index.
- ➢ Formulating land use change associated with the change of variable / climatic factors that occurred.
- ➢ Determine new urban climate indicator as Comfortable Index (Temperature Humidity Index : THI) in the WRF Model.
- ➢ Improve WRF model couple with WRF Chem (Green House Gases effect).
- ➢ Intensive Joint Research sies.
- ➢ To apply all of the research for human life in harmony with the environment, in cooperation/intensive Joint Research with all circles that scientists, academists, governments, politicians, NGOs, and communities.

28


Thank you
29

APN

Climate Change Adaptation intergrade to Urban planning: Experiences from Asia countries to Vietnam

Country: Vietnam
SPG: Dr. Ngo Kim Chi
Presenter by: PhD. MBA Ngo Kim Chi- SPG member of Vietnam

APN Scoping WS, Hotel Grand Cempaka, Indonesia, 6-7 May, 2013

INTRODUCTION

Provinces: 63 (6 urbanization areas)

Total: 755 urban cities; 2 (special) and 10 (Class I); 12 (Class II); 47 (Class III); 52 (Class IV) & 632 (Class V); 10.000 rural residential areas; > 160 industrialized areas which are a basis for the ongoing development of infrastructure; 632 new urban projects

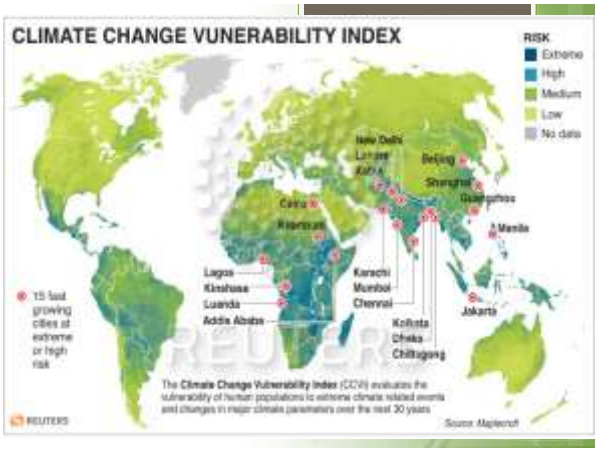
The population: 87,84 million (2011), growth rate 1,05%, Urban population: 46.5%.

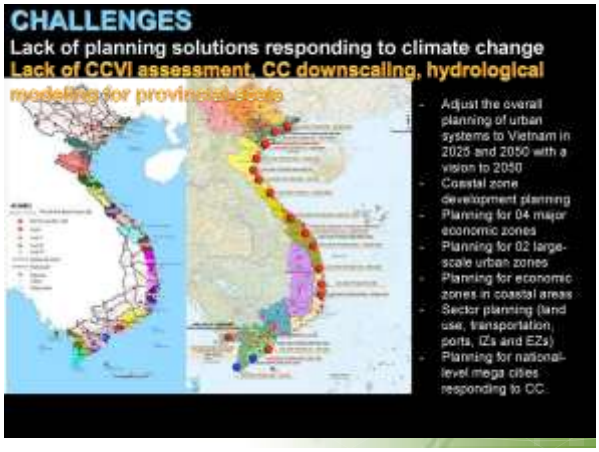
Total land area: 325.360 km2; Urban land: 31.061 km2, Municipal land 12.373 km2; Urban constructional land: 475.000 ha;

GDP: Urban sector: ~ 70% GDP of VN

Planning: 58/63 provinces/cities issued provincial spatial plans; 95 cities/towns, 589/647 towns/provinces, 161 industrial zones were developed spatial planning; 100% municipal areas in Hanoi, Haiphong, HCMC... and 40-47% of constructional land in other municipals has Detail planning 1/2000;

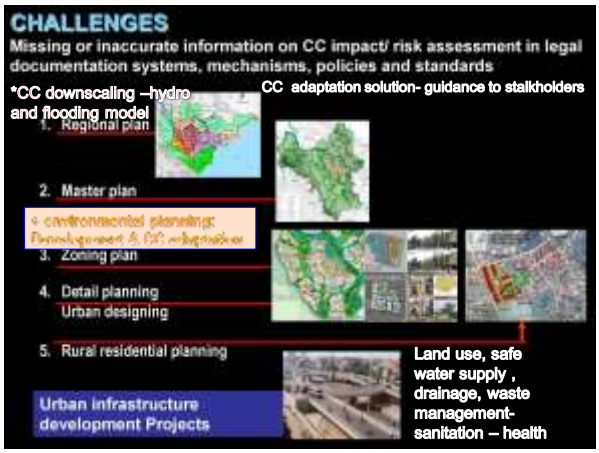
First glance in Vietnam and urban area: The population: 87,84 million (2011), growth rate 1,05%, Urban population: 46.5%.
High population in urban area: 20,8% - Agricultural-forest lands: 79,2%.
Industry: 232 Industrial parks, high population- economic zones located in coastal zone and in main river basins: Mekong, Red river.
GDP: 7.3%, industry 29% to 41% of GDP, capita income rose (US$ 260 in 1995 to US$ 835 in 2007; 1407 in 2008-2011. Vietnam impacted by CC.
EXTREMES: Frequency of tropical cyclones that affect Vietnam has increased by 0.43 event per decade in the past 50 years.
RAINFALL - FLOOD: 2009, 2010, 2011, 2012 extreme heavy rainfall - flood – loss- damages. 6-8 heavy floods/year
SEA LEVEL RISE: increased by 0.398 cm per year (1981-2006) at Vung Tau
Sea level rise: longer a warning, happening sooner to coastal zone, especially Hochiminh city, Can tho city (South), Haiphong, Nam Dinh, Thanh Hoa (North).
MEAN ANNUAL TEMPERATURE: Increased by 0.4° C since 1960, the rate of increase more rapid in the dry seasons (November, December, January; February, March, April) and in the southern parts of Vietnam. Frequency of 'hot' days (1998, 2002, 2003, 2006, 2007 and 2009) increased since 1960, annual frequency of 'cold' days decreased.
Heat waves – Drough in wide area.
Storm. "El Niño", more frequent storm frequency, stronger, wider, deeper, major damage due to population density areas

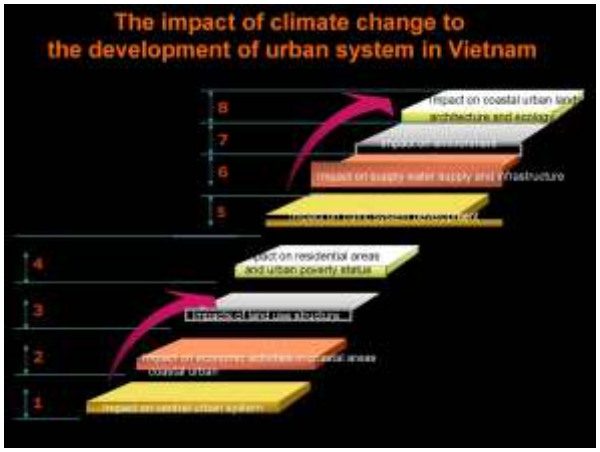




- **Gap:** data and information systems – Need tools
  - Gap between related institutions.
  - Gap in research on adaptation for reduction of losses and damages
  - Gap in assessment the technology priority for reduction of losses and damages
  - Capacity building, human resources, participation of communities and relevant units.
- Regional collaboration on data for Climate Change Vulnerability Index CCVI due to its complexity (based on 40-42 social, economic, environmental risk assessment (1) affected by the natural disaster related to CC; (2)sensitive human population model, development, natural resources, dependence on industry/agriculture & conflicts; (3) vulnerability of future adaptability of policies/infrastructures dealing with CC.
- CCVI, situation assessment for planning response to CC,disaster reduction.

=> Fill the gaps by learning from international collaboration JICA, ADB, WB… APN, …..





Action

Aprove National Target Program on CC Adaptation (QĐ 158 dated 02.Dec.2008)

Building CC scenario on sea level raise (June 2009), updated (March 2012) more detail on focus province

Aprove National CC Strategy (QĐ 2139 dated 05.Dec.2011)

Established National Committee on CC (QD 43 Dated 09.Jan.2012)

2012- Start implementating CC and sea level raise response models given priority to coastal zones Mekong delta rivers.

The government has just aprove list of action plan on Climate change adaptation, 2013

Buidling approach:

Infrastructure Planning And Coastal Zone Development; Development System For Dam And Disaster Management In VN.
Water Resource Protection Facilities

Non building approach:

Strengthening National Capacities, Research, Policies on Respond To Climate Change,
Study Vulnerability And Inventory Greenhouse Gas Emissions, Earlier warning

Scientific themes, regional research and capacity development between South Asia cities at CC risk and urban planning

- **Collaboration and experience exchanging climate change down scaling projection, hydro- flooding modeling and assess CCVI in SEA and VN:** for major urban coastal/River zones in sector of land use water resource; energy-transport; ecosystem and related health issues
- **Research the**. Research the institutional gap. Research on the data gap (Adaptation assessments, models, and tools. Assess the country's technological needs for adaptation. Zoning maps are needed to depict areas that are at risk from various natural hazards).
  Research on integrate the irrigation system for flood control, salinity prevention.
  Develop sustainable livelihood, energy-transport for impacted zones (livestock in sub urban area, farming in sub urban area, industry sector and industrial zones)
- **Sustainable natural resource utilization, management (land, water, solid waste)**
- **Water quality- sanitation- health for cities with high density population**
- **Integrate CC adaptation and and mitigation solution; South East Asia and APN cities' collaboration on sharing best practices on CC adaptation and eco-cities,** GHG emission reduction, use alternative energy, 3R solution, water resource protection, waste and landfill management, create sound material recycling society.

National strategy on CC:

Strategic task 1: Proactive disaster preparedness and climate monitoring

a) ***Early warning***

b) ***b) Disaster risk reduction***

- **Strategic task 2: Food and water security**

a) ***Food security***

b) ***b) Water security***

Strategic task 3: Suitable proactive response actions to sea-level rise in vulnerable areas

- **Strategic task 4: Protection and sustainable development of forest, increasing carbon removals and biodiversity conservation**

Strategic task 5: GHG emission reduction

a) ***Development of new and renewable energies***

b) ***b) Energy saving and efficiency***

- *Industrial production and construction*
- *Transportation*
- ***c) Agriculture***
- ***d) Solid waste management***

Strategic task 6: Increase role of Gov in CCA

a) ***Amendment and integration of CC into others strategies and planning***

b) ***b) Strengthening institutional capacity***

Strategic task 7: Community capacity de. To CC
Communities responding to climate change

a) ***b) Improving the public health system***

b) ***c) Raising awareness, education and training***

Strategic task 8: Scientific and technological development for climate change response

Strategic task 9: International collaboration & integration to enhance country status related to CC issues

Strategic task 10: Diversification of financial resources and higher effective investment

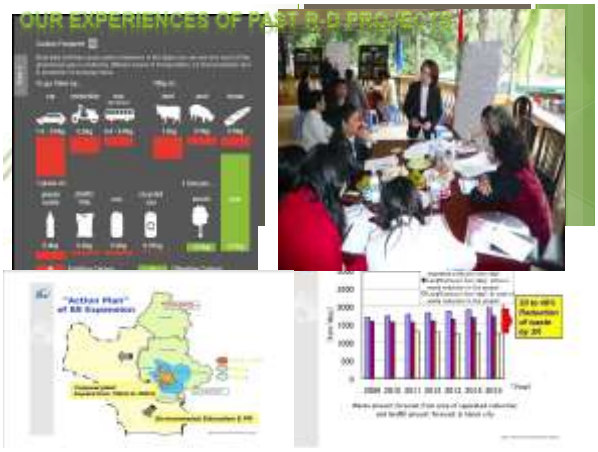
Priority programmes for 2011-2015

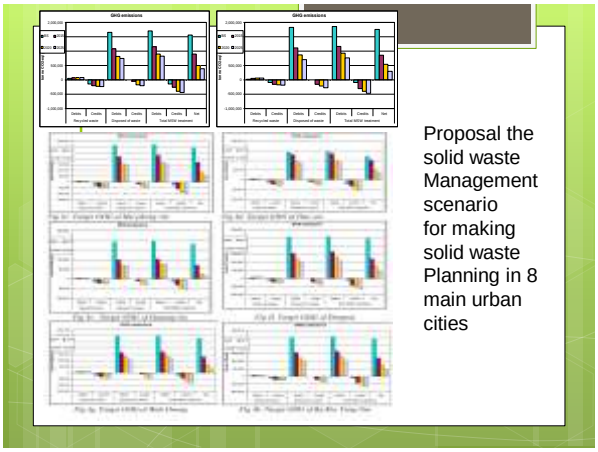
- Based on the Strategy's principles, visions, objectives, its implementation phases, the Government has developed programmes for review, development, implementation:
- a) The National Target Programme to Respond to Climate change, development of extended plan for 2016-2025;
- b) The National Scientific Programme on Climate Change;
- c) The Hydrometeorological Observation Network and Forecasting Technology Modernisation Programme by 2020;
- d) The water resources management and climate change adaptation programmes for Mekong and Red River Deltas;
- e) The GHG emission inventory, reduction, management of emission reduction acts
- f) The climate change response programme in megacities;
- g) The sea dyke and river embankment upgradation, reinforcement programme under climate change and sea level rise conditions.
- h) The public healthcare improvement programme in the in climate change, SLR
- j) The socio-economic development programme in inhabited island to cope with climate change and sea level rise.
- k) The pilot programme for community's effective response to climate change with an aim for further expansion.

Our experiences on

WATER SECTOR REVIEW – CC related

- **Environmental status, CCVI study and assessment for 17 river basins in Vietnam-> make proposal for:**
- **Capacity building in integrate waste management and SWS and sanitation and control salinity.**
- **Proposal building solutions**
- **- Proposal on integrate water management and protection and water treatment plan for hospital waste water treatment and for some important river basin: Nhue Day (Hanoi area), Dong Nai – Thi Vai (Hochiminh area)**
- **- Proposal on scientific studies on water technology.**



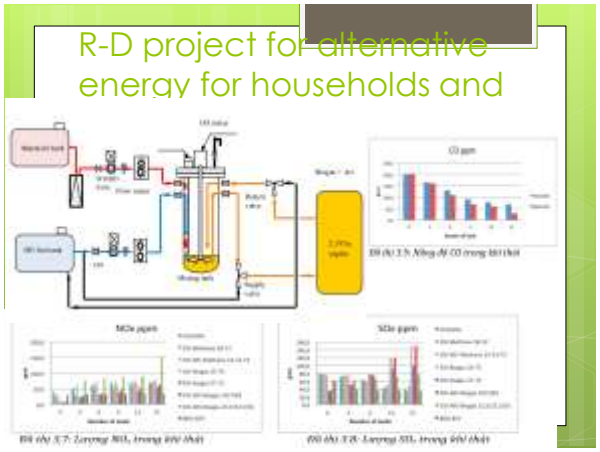


Proposal the solid waste Management scenario for making solid waste Planning in 8 main urban cities

For small scale household production


For enterprise


INTERACTIVE SESSION I
Working with local leaders to make the plan on drainage canal improvement


R-D project for alternative energy for households and


Test of loads

Bio fuel from waste cooking oil, fish oil
Biomass waste and landfill gas,
working with enterprise expand the technology

Vietnam and SEA SRC on summer school

- Contribute to the CC downscaling and hydro-metrological modeling as well as CCVI study and assessment.
- Introduction the results to the risk cities (Hanoi city – typical city for Red Delta River, Hochiminh city (Mekong Delta River) in term of environmental planning
- Scoping solution for land use for the ecosystem and environment protection and eco cities
- Waste resource protection
- Waste management – Public Health related to CC
- Energy saving and Alternative energy
- Provide learn for doing and best practice sharing

THANK YOU