

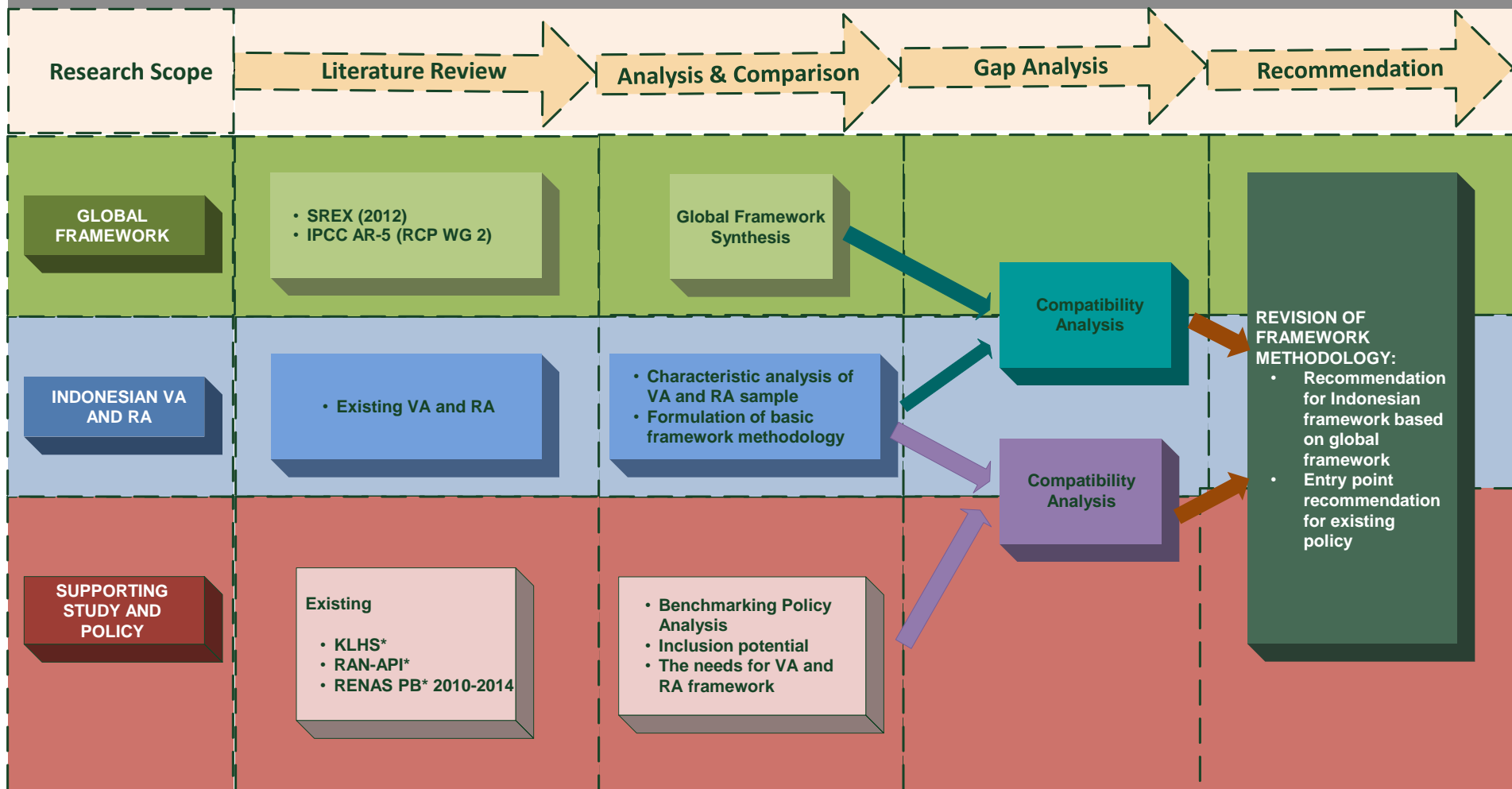


STUDY ON BASIC FRAMEWORK OF CLIMATE VULNERABILITY AND RISK ASSESSMENT IN INDONESIA



Research Methodology and Objectives

BASIC FRAMEWORK OF CLIMATE VULNERABILITY AND RISK ASSESSMENT



*KLHS = *Kajian Lingkungan Hidup Strategis* (Strategic Environmental Assessment)

*RAN-API = Rencana Aksi Nasional-Adaptasi Perubahan Iklim (National Action Plan on Climate Change Adaptation)

*RENAS-PB = Rencana Nasional-Penanggulangan Bencana (National Plan on Disaster Management)



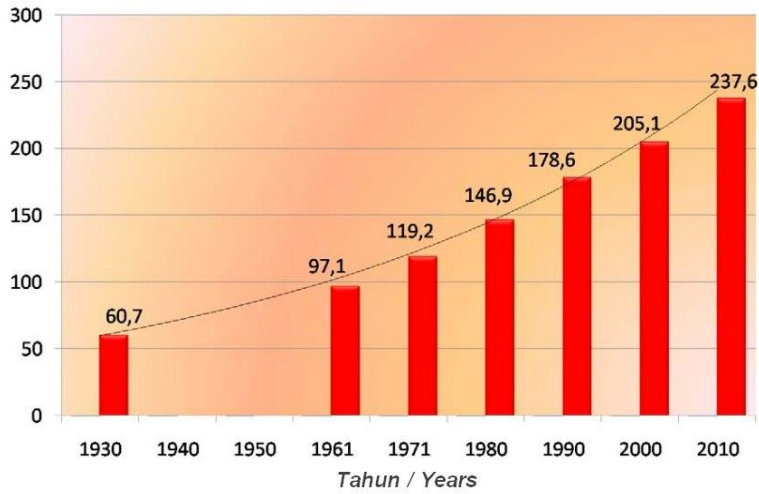
INDONESIA AND CLIMATE CHANGE IMPACT

What Makes Indonesia Prone?

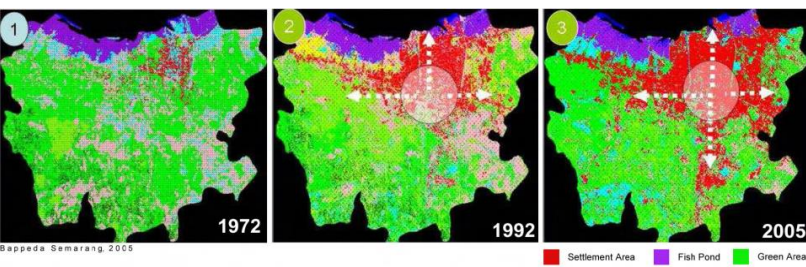
- ❑ The monsoon affects annual rainfall pattern in most parts of the area
- ❑ The tropical climate and its location in the equator makes the country has a full year of sunshine thus the average temperature is relatively high
- ❑ The high humidity level due to 2/3 of the total area is covered by water
- ❑ An archipelago with mountainous and long coastline topography and fertile soil condition; increases the chance of hydrometeorology disaster → highly affected by climate and weather variability



Why Indonesia Become Vulnerable?



- ❑ High population number and concentrated in the urban areas
- ❑ The role of poverty level and local culture on society's adaptation capacity

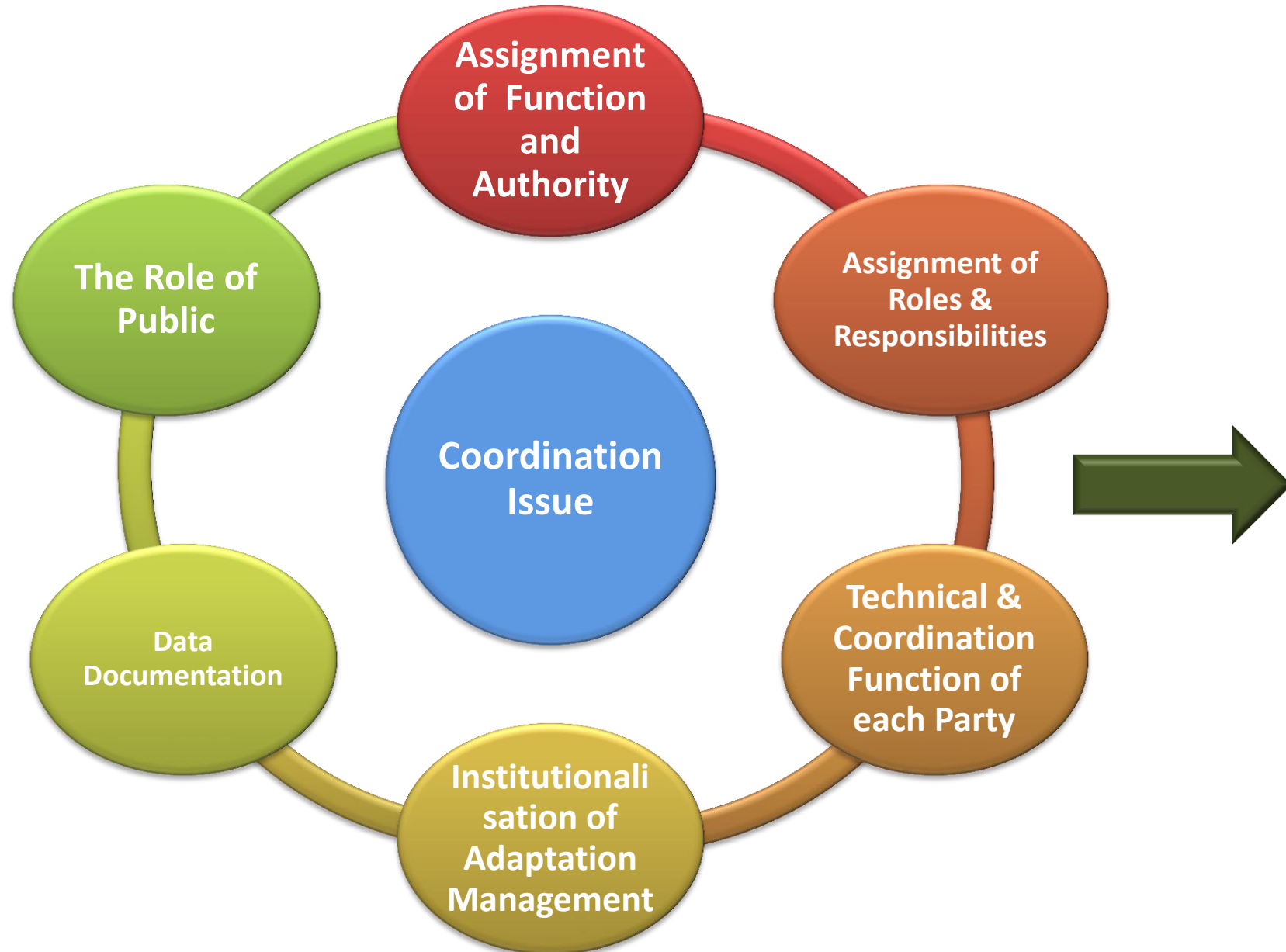


- ❑ Residential development pattern often grow towards climate-disaster prone area
- ❑ The development planning process which has not fully included climate change issue (e.g: most land-use planning have not took into consideration climate change impacts in an area)



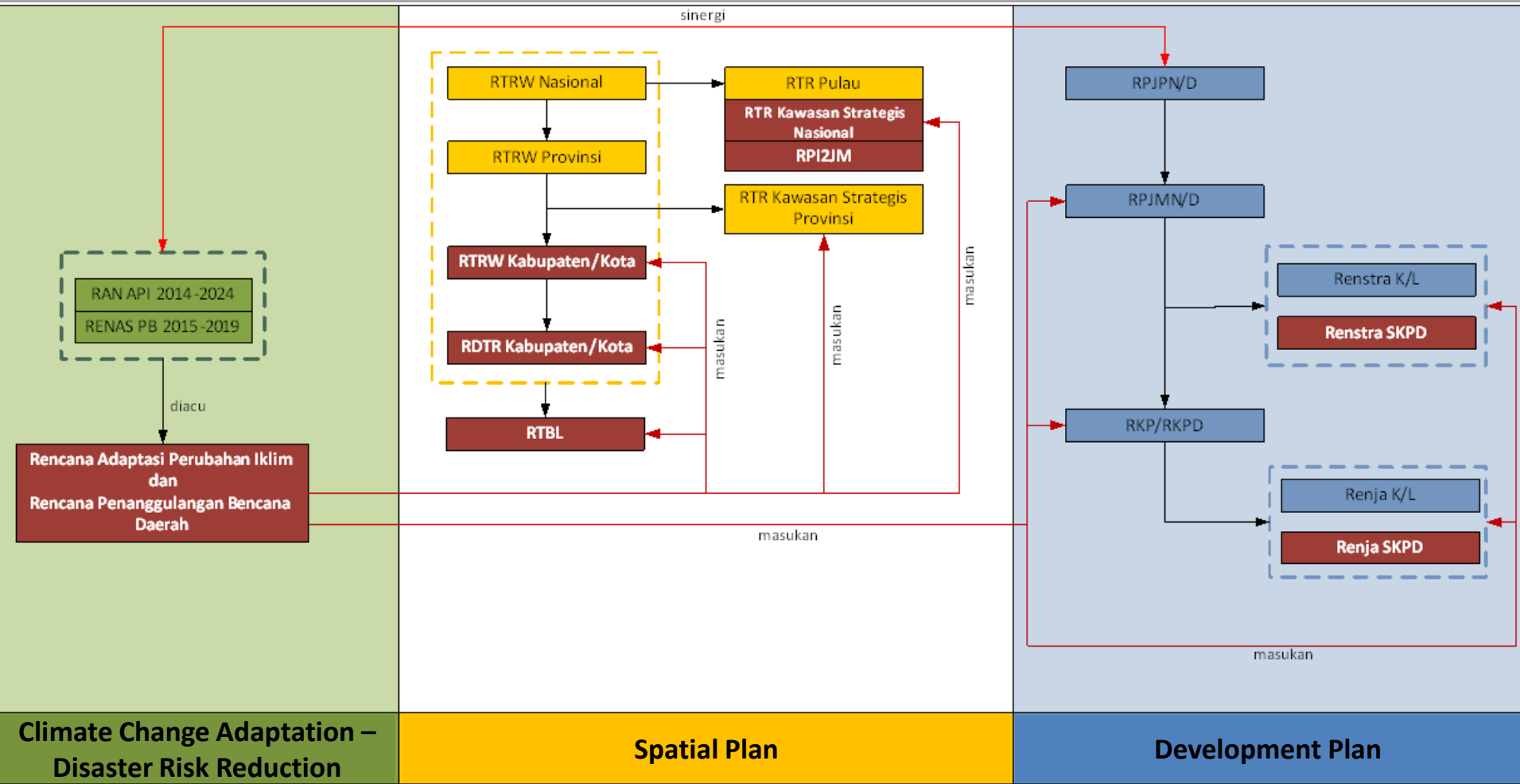
Example: Historical development pattern of Semarang city show that the city grow towards areas which are predicted to be submerged in future time

Impacts of Governmental Administration



FORMULATION OF RELATED POLICIES

Inclusion of Issue

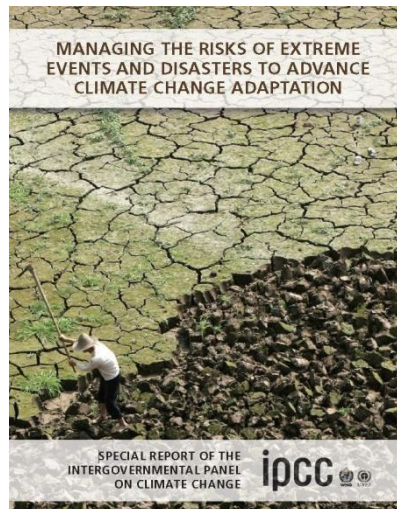


Needs clarity on inclusion mechanism of RAN-API and RENAS PB into the development planning by considering the assignment of authority

KLHS as the potential instrument for the inclusion of API and PRB context into development planning process

GLOBAL FRAMEWORK

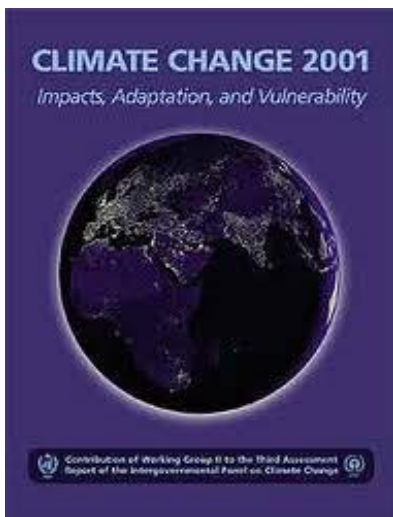
References



SREX, 2012

Primary aspects for assessment:

- Framing
- Framing the terminology of Vulnerability, Exposure and Sensitivity in climate vulnerability and risk assessment
- Interconnection and integration of CCA and DRR



Draft Report WG-2 AR-5, 2013

Primary aspects for assessment:

- Framing
- Climate scenario
- Interaction between climate change impacts-vulnerability-adaptation and sustainability development
- Framing the terminology of Vulnerability, Exposure and Sensitivity in climate vulnerability and risk assessment
- Risk assessment

**CLIMATE VULNERABILITY
AND RISK ASSESSMENT IN
INDONESIA**

Comparison Aspect

- Assessment Scale
- Assessment Approach
- Assessment Objectives
- Utilization of Climate Scenario
- Hazard Analysis
- Sectoral Scoping



VA and RA Approach



3 TYPES OF APPROACH

Top-down

- **Hazard-risk** approach
- **Macro/meso/micro** scale
- **Focus** on the **vulnerable system** and its **impact**
- Describes the **magnitude and intensity of the impact**
- Process using **climate scenario**
- **Calculated risk**
- **Output** in forms of **spatial and temporal distribution** of the impacts and **the strategic adaptation measures**










Bottom-up

- **Political-economical-social** approach
- **Micro/community** scale
- **Focus** on **background** and **factors that form vulnerability**
- Providing **guidance** for the appropriate **adaptation measures**
- **Current and near future vulnerability**
- **Perceived risk of the social conditioning of the risk**
- **Output** in forms of **specific adaptation measures**

Integrated











- **Macro/meso/micro** scale
- Focus on **impacts of change in the climate parameters** and **the sensitivity and capacity of the system**
- Performing **compatibility analysis** using the existing and foreseen development plan document
- Process using **climate scenario**
- **Calculated risk**
- Output in forms of **spatial and temporal distribution** of the impacts and **policy recommendation**

Approach vs Scale

		Scale			
		Macro	Meso	Micro	Community
A p p r o a c h	Top-down			 	
	Bottom-up				 
	Integrated			 	

- a. Climate Change Vulnerability Mapping for **Southeast Asia** (Yusuf&Fransisco, 2009)
- b. Risk and Adaptation Assessment to Climate Change in **Lombok Island, West Nusa Tenggara Province** (KLH-GIZ-WWF, 2010)
- c. Study of Climate Change Vulnerability in **Riau Islands** (DNPI, 2012)
- d. Climate Change Risk and Adaptation Assessment **Tarakan** (KLH, 2012)
- e. Climate change Risk Profile of **Blitar** (GIZ-Paklim, 2012)
- f. Participatory Research on Climate Vulnerability in **Sikka, Lembata and Timor Tengah Utara** (ITB&PLAN, 2012)
- g. Climate Change Risk Study of **Cirebon** (Mercy Corps-CCROM-APEKSI-PemKot Cirebon, 2013)
- h. Vulnerability and Risk Mapping Study in **Jakarta** (Mercy Corps-FMIPA UI, 2011)
- i. Planning Integrated Coastal Adaptation Strategies For **North Jakarta Security** (IAP, 2013)

Objectives vs Scale

		Scale			
		Macro	Meso	Micro	Community
Objectives	Spatial Distribution and Comparison				
	Formulation of Adaptation Policy			 	
	Research/Method's Trial			 	

- a. Climate Change Vulnerability Mapping for **Southeast Asia** (Yusuf&Fransisco, 2009)
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Hazard vs Objectives

		Objectives		
		Spatial Distribution and Comparison	Formulation of Adaptation Policy	Research/ Method's Trial
Hazard Analysis	Single-hazard	c	i, e, b, d, h	i
	Multi-hazard	a, g	f, g	

- a. Climate Change Vulnerability Mapping for **Southeast Asia** (Yusuf&Fransisco, 2009)
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Global vs Local Findings (1)



Components	Context	Findings	
		GLOBAL FRAMEWORK	INDONESIAN VA & RA SAMPLES
I N P U T	VA and RA Framing		Interpretation on climate vulnerability and risk assessment as well as building blocks (element) of vulnerability determines the process and method used in the assessment
	Vulnerability Framing	<ul style="list-style-type: none"> • Vulnerability must be observed from biophysical, economical, and social dimension (including institution and regulation) • Building blocks (element) of vulnerability comprise of exposure, sensitivity, and adaptive capacity 	Focusing on biophysical and economical dimensions; social dimension tends to be disintegrated in the climate vulnerability and risk assessment
		Exposure is the vulnerability element that is contextual to hazard	Assessment which associates exposure as hazard can be identified
		Adaptive capacity has a broader scope and longer time frame compared to coping capacity	

Global vs Local Findings (2)



COMPONENT	CONTEXT	FINDINGS	
		GLOBAL FRAMEWORK	INDONESIAN VA & RA SAMPLES
P R O C E S S	Hazard Analysis		Missing link between climate model and hazard analysis affect the 'translation' of assessment results into adaptation measures
	Climate Scenario	Linear SRES vs paralel RCP (gap within scenario translation)	The effect of climate scenario is not visible in the vulnerable projection process
			The application of climate scenario is insignificant in the making of the VA and RA (especially when applied in the community scale); tends to just showing the future trend
	Approach		Micro and community scale tend to use bottom-up approach (with non-government actor as the assessment actor); provides a more specific adaptation measure but for short term implementation
Climate Risk		The correlation between perceived risk (used in the bottom-up approach) with climate change still cannot be justified	

Global vs Local Findings (3)



COMPONENT	CONTEXT	FINDINGS	
		GLOBAL FRAMEWORK	INDONESIAN VA AND RA SAMPLES
O U T P U T	DRM (Framework and time frame)	Risk management and climate change adaptation framework must be in cyclic form to accommodate the system's characters which are long-term, dynamic, and covered by uncertainty	Ideally, multi-hazard and multi-sector analysis would be able to provide recommendation on a more strategic adaptation options
			Time frame of climate projection for distant future incohesive with the timeframe of policy formulation
	DRR-CCA Integration	<ul style="list-style-type: none"> • DRM and CCA integration will assist in formulating a more effective and prioritized adaptation policy recommendation • DRM = single-hazard analysis and recommendation of hazard-specific adaptation action, CCA = multi-hazard analysis and recommendation of strategic policy 	Single-hazard analysis generally used by research applying DRR-frame; facilitates in formulating the hazard-specific adaptation action
			Single-sector provides an in-depth reference in determining priority sector; yet does not show correlation between sectors
			Ideally, multi-hazard and multi-sector analysis would be able to provide recommendation on a more strategic adaptation options
			CCA and DRM integration measure can be seen in some studies, but with a heavier "disaster atmosphere"
	Combination of CCA and DRM depends on the understanding of significance and interaction between physical dimension of climate change and the affecting social dimension		

**RECOMMENDATION FOR CLIMATE
VULNERABILITY AND RISK
ASSESSMENT BASIC FRAMEWORK**

Implications of Global Framework to The Indonesian Context



1

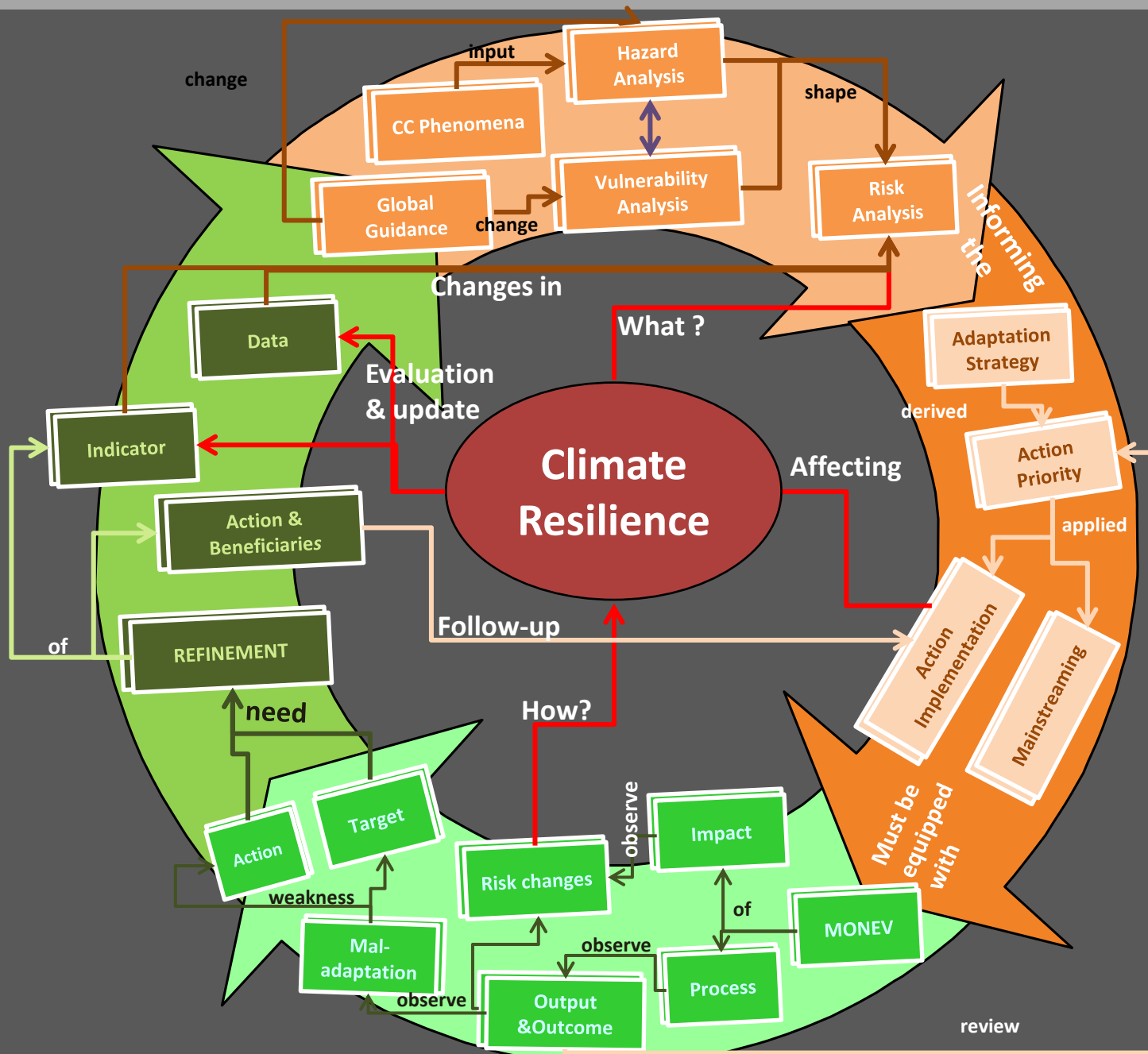
No detailed boundaries to interpret the concept of vulnerability element (building blocks) and dimension → provides space to formulate a more generic and flexible VA & RA framework that suitable for Indonesian context

2

Dynamic character and surrounded by uncertainty driven the need to implement an iterative and continuous mechanism for CCA and DRM process, which thus affecting in:

- ❖ CCA and DRM must be included within the national development plan system to ensure its implementation in continual development manner
- ❖ The need of a qualified, holistic, and synergic horizontal and vertical coordination system within the institutional framework
- ❖ The need of a synergy between VA & RA updating process with the policy as well as government's program/activity formulation process
- ❖ The need of supporting mechanism for periodical updating process of VA and RA, which able to capture the character's dynamic and the linkages between CCA-DRM-area development

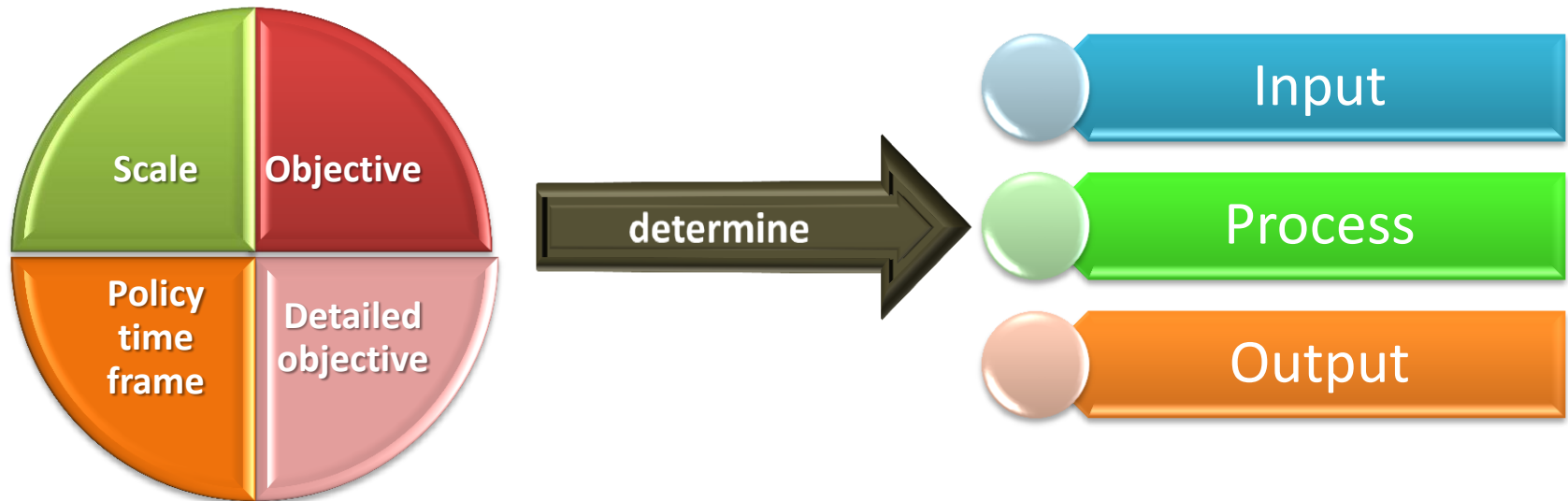
Process Flow



Preliminary Recommendation for Basic Framework of Indonesian VA and RA

1 Determination of Approach (1)

APPROACH DETERMINED BY



1 Approach Determination(2)

A P P R O A C H	SCALE				OBJECTIVE								POLICY TIME FRAME	
	Macro	Meso	Micro	Community	Comparison		Action Plan		Policy & Strategy		Adaptation Option**	Research/Trial	Short-term***	Long-term
					Resource allocation & Policy Recommendation	Regional profile	Hazard/Sector Specific*	Multi-hazard/Sector	Public Policy	Regional Assessment & Strategic Plan				
Top down	√	√	√		√	√		√	√	√	√	√	√	√
Bottom up			√	√			√				√	√	√	
Integrated		√	√		√		√	√	√	√			√	√

Notes:

***Bottom-up approach** will be more suitable for VA and RA objective that intended to formulate **hazard/sector specific action plan**

****Top-down approach** will be more suitable for VA and RA objective that intended to formulate **adaptation option**

*** **Short-term policy time-frame** suited better for **bottom-up, integrated and top-down approach** in subsequent manner

2 Substance of Approach(1)

COMPONENTS			TOP-DOWN	
			VULNERABILITY	RISK
INPUT	LOCAL DATA	Yes	<ul style="list-style-type: none"> E, S, and AC indicator data with consideration of Climate Impact Modelling (CIM) Compiled generic secondary data Quantitative and qualitative data (potentially generalized) Multi-sectors 	<ul style="list-style-type: none"> Compiled generic secondary data Down-scale data for meso and micro level
		No		
	CLIMATE DATA	Yes		✓ For hazard analysis
		No		
	DISASTER HISTORICAL DATA	Yes		✓ For hazard analysis
	No			
PROCESS	CLIMATE SCENARIO	Yes	✓ As a basic assumption in CIM	✓ Detailed for hazard analysis
		No		
	STEPS		<ul style="list-style-type: none"> CIM (to determine key indicators) Current vulnerability: <ul style="list-style-type: none"> Determination of E, S, and AC indicator with consideration of CIM Quantitative analysis for quantifiable generic data Qualitative analysis for unquantifiable generic data Future Vulnerability: <ul style="list-style-type: none"> Climate-impact modelling Vulnerability projection based on climate-impact modeling Analysis is usually done in composite manner (multi sector analysis) 	a. Hazard Analysis, usually multi-hazard analysis <ul style="list-style-type: none"> Including: <ul style="list-style-type: none"> Downscaling global climate model by using local data Historical data for scenario model becomes the basis for correction factor for global climate model revision Climate variability projection based on global climate model revision Hazard projection based on climate data and/or historical hazard by using climate variability projection b. Risk Analysis, including: <ul style="list-style-type: none"> Combination of hazard analysis and vulnerability analysis, both for current and future risk
OUTPUT			<ul style="list-style-type: none"> Temporal and spatial distribution of vulnerability and risk Multi-hazard and/or multi-sector policy, strategy, and action plan Shopping list of adaptation option Methods/research trial 	

2 Substance of Approach (2)

COMPONENTS			BOTTOM-UP	
			VULNERABILITY	RISK
I N P U T	LOCAL DATA	Yes	<ul style="list-style-type: none"> • Specific data (including indicator that can represents the outcome of the activity) • Primary data • Quantitative and qualitative data (qualitative is more dominant) • Data dominated by adaptive capacity indicator 	a. For community: <ul style="list-style-type: none"> • Local specific • Primary data • Quantitative and qualitative data (qualitative is more dominant-perceived risk) b. For micro level <ul style="list-style-type: none"> • Local specific • Primary Data • Quantitative data
		No		
	CLIMATE DATA	Yes		✓ a. For community: as background information b. For micro level: confirmation of historical hazard
		No		
	HISTORICAL DISASTER DATA	Yes		✓ (confirmation of perceived risk)
		No		
P R O C E S S	CLIMATE SCENARIO	Yes		
		No		✓
	STEPS		<ul style="list-style-type: none"> • Determination of E, S, and AC indicators which are able to represent the outcome of the activities • Analysis by quantifying the qualitative parameters for each element 	a. For Community : Identification and analysis of perceived risk b. For micro level: <ul style="list-style-type: none"> • Single hazard analysis • Risk determination (VA-hazard analysis)
OUTPUT			<ul style="list-style-type: none"> • Sectoral specific/hazard specific action plan • Shopping list of adaptation option • Methods/research trial 	

2 Substance of Approach (3)

COMPONENTS			INTEGRATED	
			VULNERABILITY	RISK
INPUT	LOCAL DATA	Yes	<ul style="list-style-type: none"> • E, S, and AC indicator data with consideration of Climate Impact Modelling (CIM) <ul style="list-style-type: none"> ○ Compiled generic secondary data ○ Specific secondary data for sector/ hazard ○ Policy and institution data • Multi/single - sector/hazard 	<ul style="list-style-type: none"> • Compiled generic secondary data • Down-scale data for meso and micro levels
		No		
	CLIMATE DATA	Yes		✓ For risk projection
		No		
	DISASTER HISTORICAL DATA	Yes		✓ For risk projection
		No		
PROCESS	CLIMATE SCENARIO	Yes	✓ As basis assumption in CIM	✓ In detail and in local scope (down-scaled scenario)
		No		
	STEPS	<ul style="list-style-type: none"> • CIM (to determine key indicators) • Current vulnerability by considering CIM <ul style="list-style-type: none"> ○ Quantitative analysis for indicator in each element by using two clusters of secondary data ○ Mapping of existing and foreseen related policy and its institutional analysis • Future Vulnerability: <ul style="list-style-type: none"> ○ CIM ○ Using down-scaled scenario for projection ○ Vulnerability projection based on CIM • Analysis done iteratively, continuous, and dynamic 	a. Hazard Analysis, usually using multi-hazard analysis, including: <ul style="list-style-type: none"> ○ Development of down-scaled scenario for V and H analysis ○ Data local input to down-scaled scenario ○ Hazard projection based on climate data and/ or historical hazard by using down-scaled scenario b. Risk Analysis, including: <ul style="list-style-type: none"> ○ Combination of H and V analysis, both for current of future risk by considering iteration from CIM <ul style="list-style-type: none"> • Compatibility analysis between recommendation for strategy, program, and adaptation action plan with substances and timeframe of existing foreseen and policy • Analysis done iteratively, continuous, and dynamic 	
OUTPUT	<ul style="list-style-type: none"> • Temporal and spatial distribution of vulnerability and risk as an input for policy recommendation and resource allocation • Policy, strategy, and action plan that are single/multi-hazard and/or single/multi-sector that has considered its compatibility with the existing and foreseen policy 			

Proxy Indicator (1)



DIMENSION	PROXY INDICATOR			Existing VA & RA	DATA SOURCE
	Exposure	Sensitivity	Adaptive Capacity		
Biophysical	Potentially vulnerable area, such as: low level plain, coastal, mountain, dry areas, developed small islands, etc			√	<ul style="list-style-type: none"> • WWF • K/L • Center and Local BPS (Statistical Agency) • SKPD (Local Agency) • BUMD (Local-Government Business Unit)
	Geography, location and place: <ul style="list-style-type: none"> a. Disaster hotspot b. Advancement of area development (developed or developing) 			√	
	Physical structures: <ul style="list-style-type: none"> a. Basic infrastructure b. Specific infrastructure for adaptation c. Infrastructure in disaster prone area d. Buildings with structure that is vulnerable to damages 			√	
	Residential pattern and projection of area development, covering: <ul style="list-style-type: none"> a. Urban environment b. Rural environment c. Informal/slum residential 			√	
				√	

Proxy Indicator (2)



DIMENSION	PROXY INDICATOR			Existing VA & RA	DATA SOURCE
	Exposure	Sensitivity	Adaptive Capacity		
Economical	Post-event of climate disaster event to business actor and society, such as: <ul style="list-style-type: none"> a. Loss and damage (residual risk) b. Disturbance to distribution and access to goods and services 				<ul style="list-style-type: none"> • World Bank • Center and Local BPS • FGD • Questionnaire
	Key drivers of the region's economic level, such as: <ul style="list-style-type: none"> a. Income and GDP b. Tax c. Domestic financial status 			√	
	Risk aversion methods, covering: <ul style="list-style-type: none"> a. Insurance b. Informal mechanism c. Donor/private 				
	Livelihood of population: <ul style="list-style-type: none"> a. Affected by climate disaster b. Urban vs rural c. Gender effects 			√	
	Politic and Economy in macro level				

Proxy Indicator (3)

DIMENSION	PROXY INDICATOR			Existing VA & RA	DATA SOURCE
	Exposure	Sensitivity	Adaptive Capacity		
Social	Demography:				<ul style="list-style-type: none"> • CIESIN • UNDP • Center and Local BPS • SKPD • Village • Interview • FGD • Questionnaire
	a) Age			√	
	b) Migration and movement				
	c) Social group and marginalized group			√	
	Education:				
	a) Accessibility and facilities			√	
b) Information dissemination					
c) Funding					
Health:					
a) Accessibility and facilities			√		
b) Community groups					
Culture:					
a) Ethnic and tradition					
b) Religion and believes					
c) Local wisdom			√		
d) Specific community groups for risk management			√		
Institution and government:					
a) Government structure and organization					
b) Social asset and network			√		
c) Policy			√		

URGENCY

The potential of KLHS as supporting mechanism for periodical updating process of VA and RA; able to show the linkages between CCA-DRR-area development

CURRENT CONDITION

Climate Change Context of VA and RA in KLHS

- ❖ Climate change is one of the primary issues to be taken into consideration in scoping stage
- ❖ VA and RA is one of the recommended assessments to analyze the effect of policy in sustainable development issue

Hindrance in Integrating Climate Change-VA-RA into KLHS

- ❖ A detailed technical guidance for KLHS development process is not yet in place, resulting in varieties of KLHS process and methodology
- ❖ Scoping process that enable the actor to negate climate change issue as primary and strategic issues → weaken the urgency of VA and RA as assessment instrument in KLHS
- ❖ There is no adequate description to localize climate change context within each assessment area → weaken climate change position as development issue

Point of Entry VA and RA in KLHS (2)

Main Issues

- ❖ The absence of detailed description regarding climate change context has weakened its position as the main issue that has correlation with other primary issues
- ❖ There is interconnection amongst assessments in KLHS that are recommended to be utilized as instrument to analyze the effect of policy in sustainable development issue



Weakened by “assessment on effects can be done in a more detailed by using one or a combination of the assessments”



Potential Role of VA dan RA in KLHS

- ❖ Climate change as the umbrella issue for primary issues
- ❖ Baseline data in VA as **background information** for scoping stage
- ❖ VA and RA as the **main assessment that has cross-sectoral nature** in analyzing the effect of policy in sustainable development issue
- ❖ Determination of VA and RA approaches that is suitable with **the objective of KLHS development**
- ❖ VA and RA can directly **provide recommendations to improve the existing policy** by considering the related strategic issue context

Needed

Advance study to analyze:

- ❖ VA and RA form that is suitable for KLHS process of **RTRW** (Spatial Plan) and **RPJMD** (Regional Midterm Development Plan)
- ❖ Adjustment of VA and RA indicator that would be suitable with **requirements in scoping stage**