On behalf of:

Federal Ministry
for the Environment, Nature Conservation,
Building and Nuclear Safety

of the Federal Republic of Germany

Implemented by

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Climate Change Vulnerability Assessment of Socio-Ecological Systems (VASES) in Vietnam

Expert Workshop: Guidance for VA Sourcebook application in EbA context

24-25 July Bonn

Contents

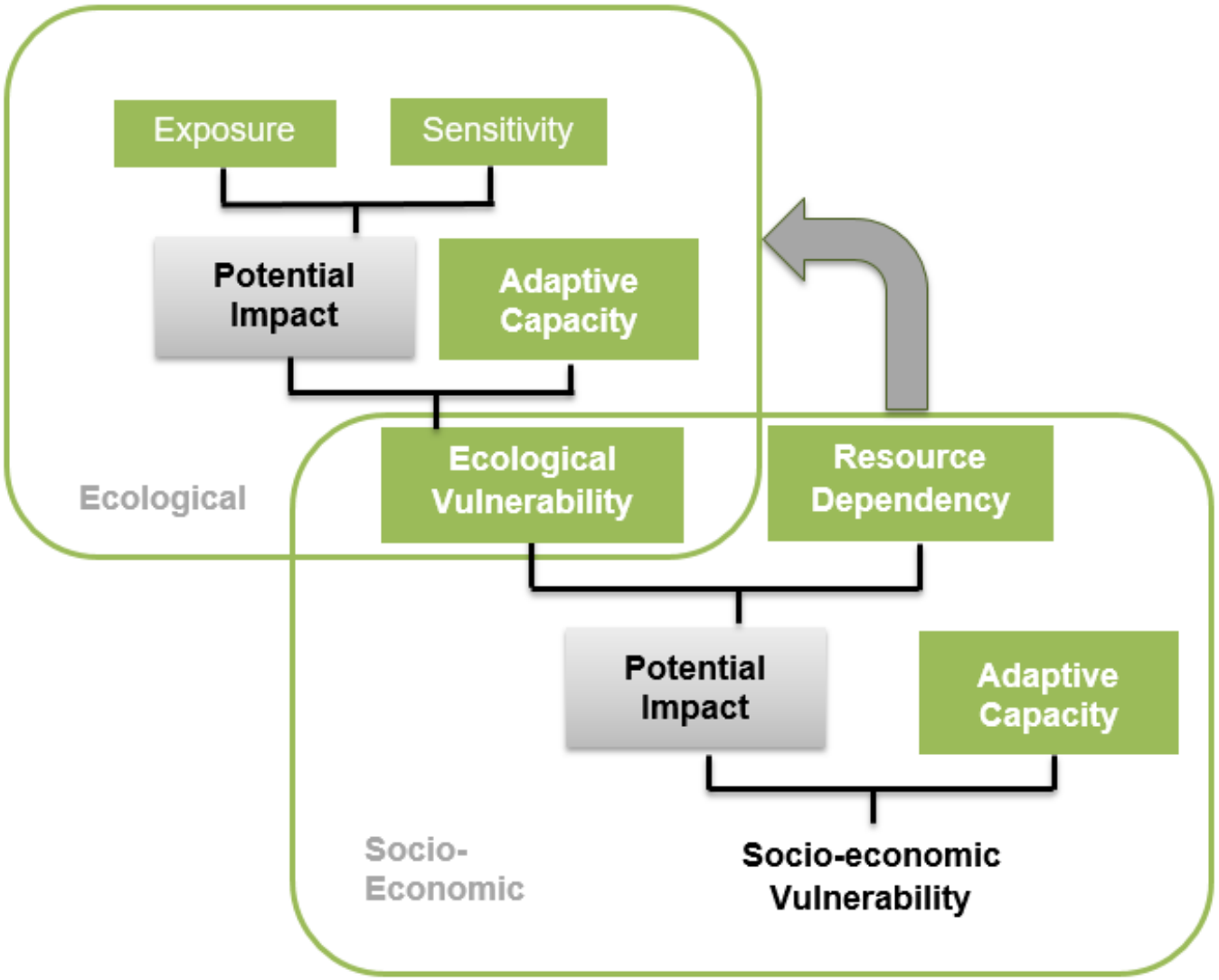
Introduction

- Provincial Vulnerability Assessment study, conducted 2016 by project 'Strategic Mainstreaming of Ecosystem-based Adaptation in Viet Nam'
- Two provinces (Ha Tinh and Quang Binh)
- Focus on socio-ecological systems
- Objectives:
  - Recommend practical EbA options for selected socio-ecological systems
  - Starting point for integrating EbA into provincial development planning

Preparing the Vulnerability Assessment – Module 1

EbA and Socio-Ecological Systems:

- **Ecology, society and economy cannot be separated**
- Natural ecosystems are the basis for human existence on this planet, and our economic activities.
- Our ecological foundations = modified & weakened from their original state (for economic activities in unsustainable ways)
- SES: Socio-ecological-system (interact with each other in a sustained way)


Exposure
Sensitivity
Potential Impact
Adaptive Capacity
Ecological
Ecological Vulnerability
Resource Dependency
Potential Impact
Adaptive Capacity
Socio-Economic
Socio-economic Vulnerability

Steps of the VASES Approach

1. Scoping the context for climate change vulnerability assessment and EbA:
Baseline and trends in ecology, society and economy
Identification of major climate-related hazards and their trends

2. Identification and prioritisation of socio-ecological systems (SES) and key economic assets (KEA)

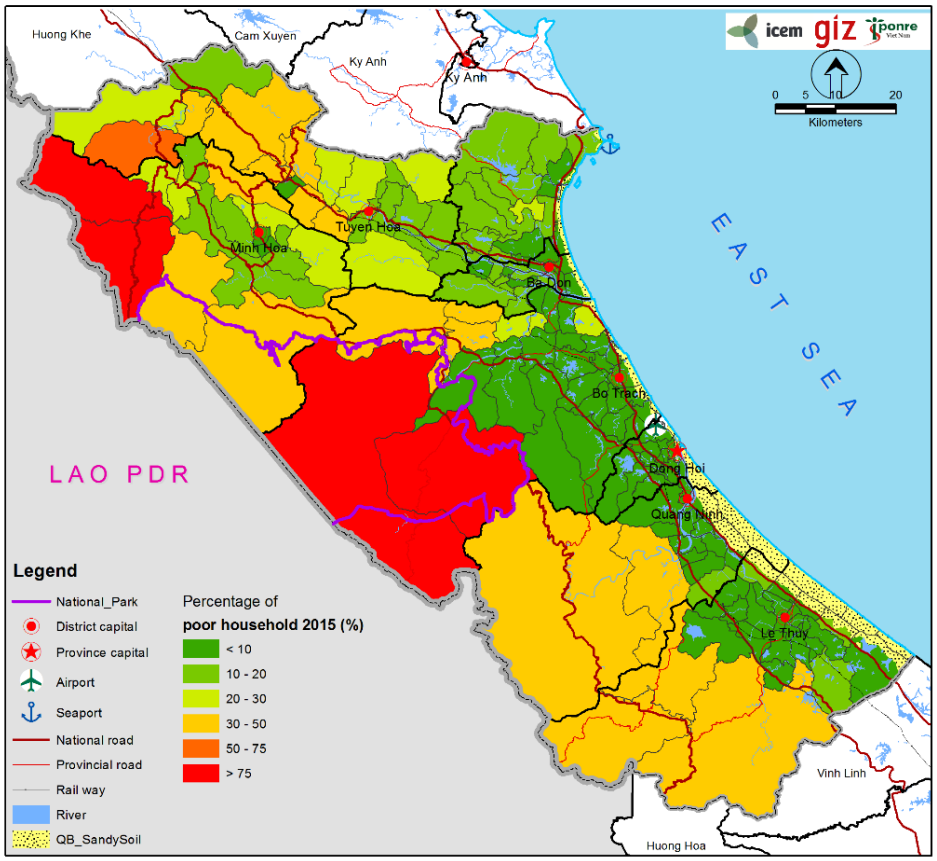
3. Vulnerability Assessment for priority SESs and KEAs
Climate Change Impact Assessment
Adaptive Capacity Assessment

4. Identification of EbA and other related options

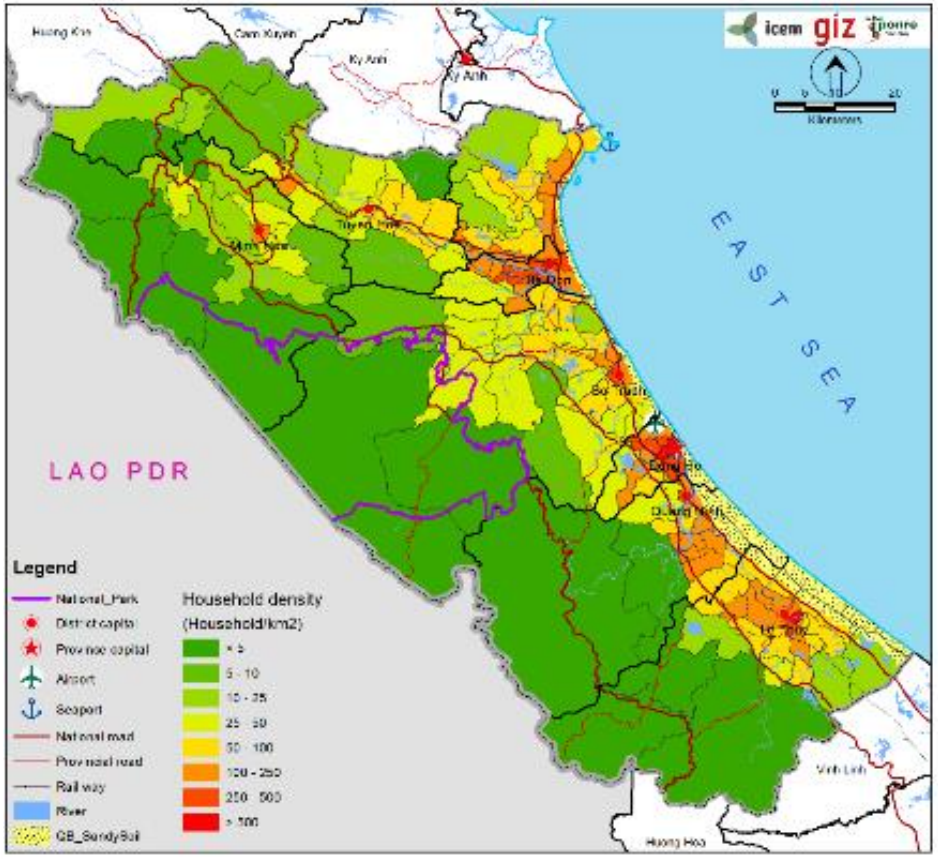
Scoping – Baseline Data – Module 1

Component	Scope/Objective
Ecosystem Profile	Identify main ecosystem types, their area and condition; connectivity in the landscape; ecological processes; ecosystem services important for local livelihoods, economic well-being, etc. What are the key ecosystems to work on for EbA?
Social Profile	Overall socio-cultural and political context patterns of poverty, ethnicity, labour, migration, gender issues. Which social groups and which types of livelihoods are most vulnerable? Where are these groups and these livelihoods found?
Economic Profile	What are the main economic sectors – contribution to employment, food production, tax revenue, GDP; what are the Key Economic Assets (KEA) - e.g. transport, energy and water infrastructure; what are the main development trends and drivers
Climate profile	Describes the province's "baseline" climate, and its history of extreme climatic events, supplemented by discussion with key informants at the provincial level on past climate and extreme weather events, and their impacts; observed trends over time; and issues of concern.
Methods and Tools	**Literature review, expert opinion, key informant interviews, focal group discussions;**

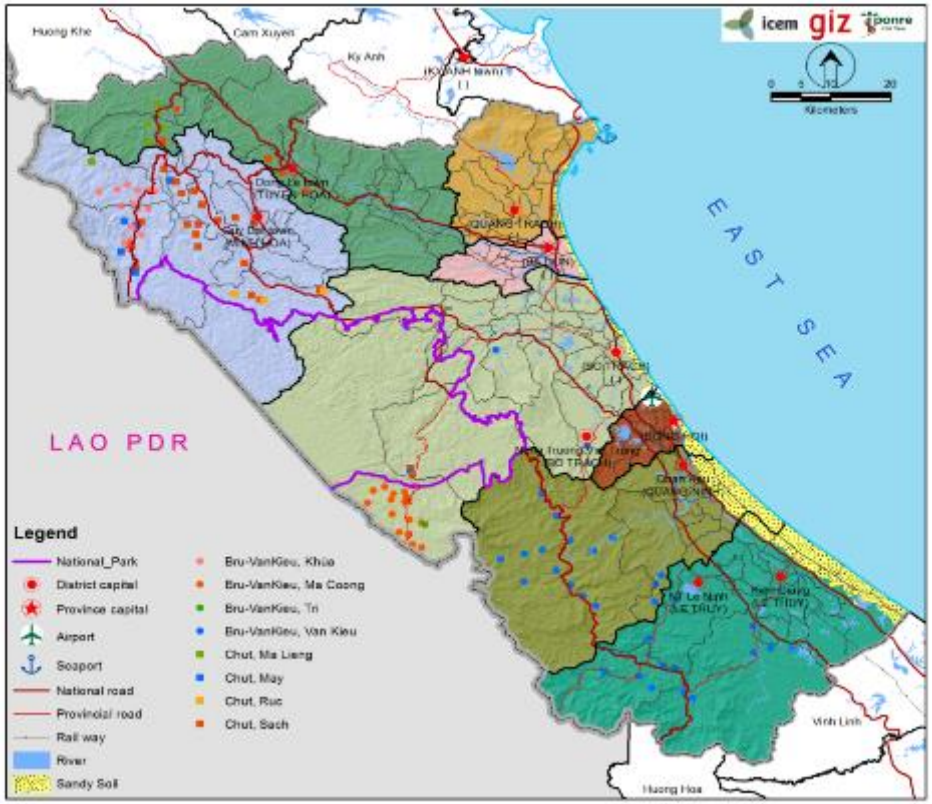
Poor households



Household density



Ethnic minorities



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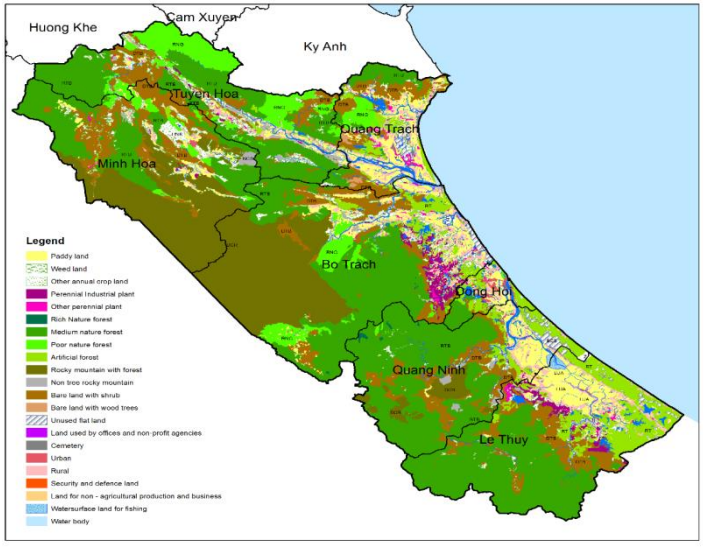
Ecological profile and Economic profile - Examples

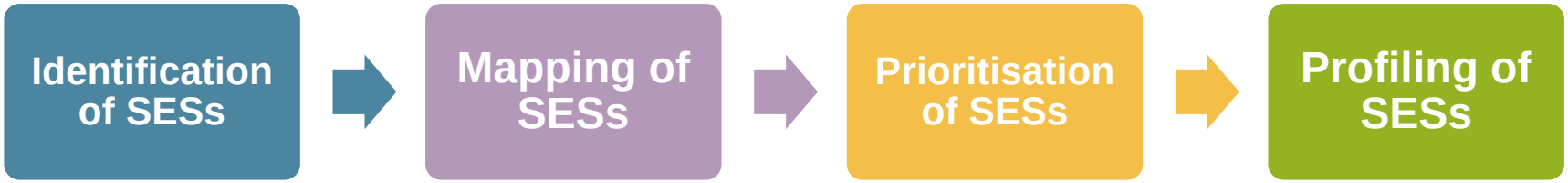
Land-use patterns in Quang Binh



Quang Binh's Sectoral GDP by Economic Agent, 2013 (billion VND)

Ownership >> / Sector VVV	State	Non-State				TOTAL
		Collective	Private	Household	Foreign	
TOTAL	7,748	170	17,653	12,483	5.9	38,061
%	23	.6	44	32.4	0.07	100
Industry	787.3	38.9	6,428	2,462	5.9	9,723
Retail	1,146	15	4,413	7,369		
Accommodation	44	-	312	898		

Identifications of Socio-Ecological Systems and Key Economic Assets – Module 2 & 3?



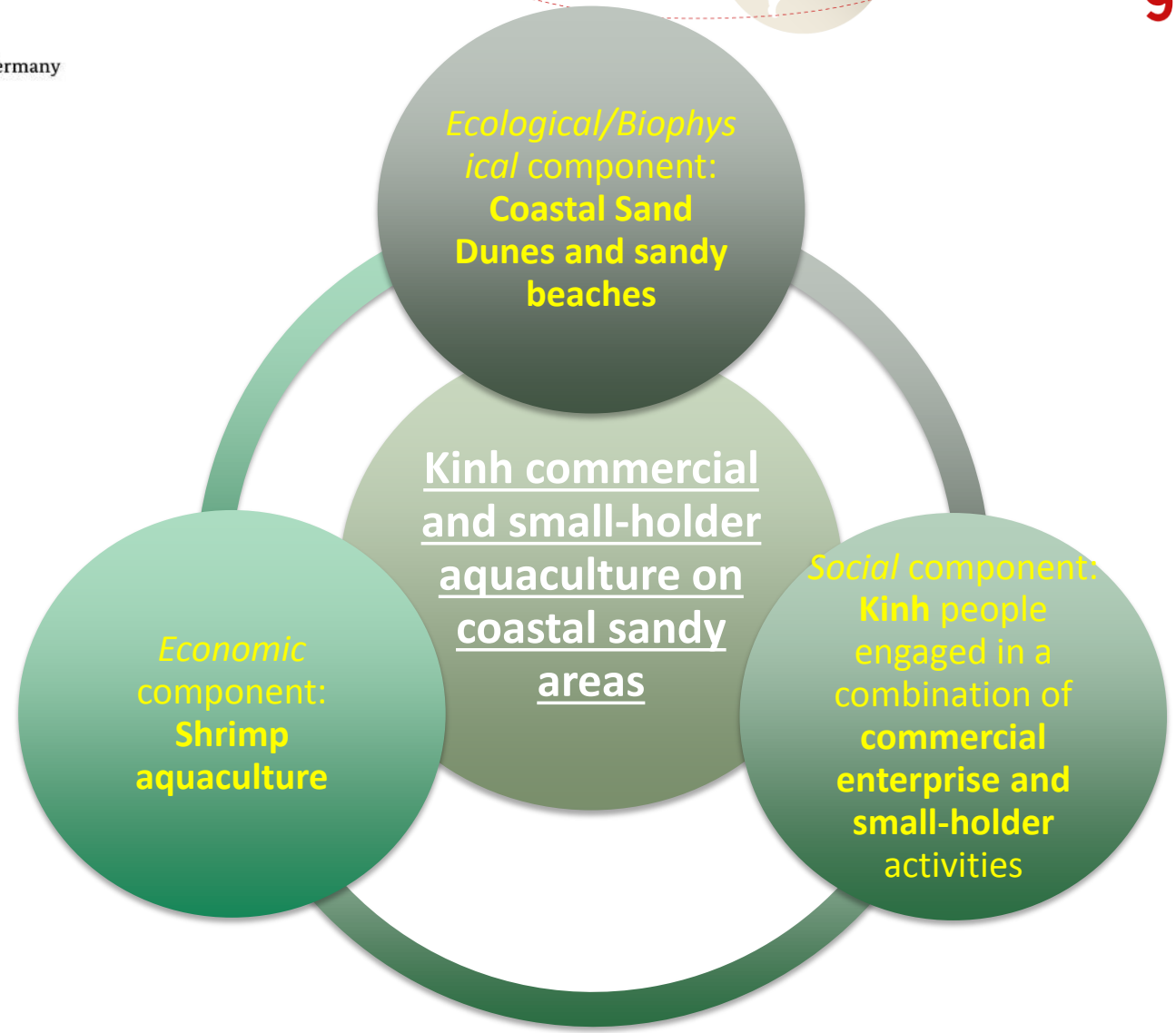
A deviation from the sourcebook approach?

Key components of SESs

Ecological	Social	Economic
Mountains > 700 m	Kinh smallholders	Paddy rice (irrigated or not)
Sub-tropical moist evergreen broad-leaf forest Coniferous forest Forest over limestone Caves, Streams and rivers	Ethnic minority smallholders	Upland rice/cassava/maize
Hill Areas < 700 > 10 m	Kinh SME commercial	Field crops
Tropical broad-leaf moist evergreen forest Forest over limestone Caves, Streams and rivers	Kinh large scale enterprise	Forest product gathering

Key components of SESs

Ecological	Social	Economic
Lowland Coastal < 10 m	State-owned enterprises	Small-holder acacia
River systems	Foreign owned enterprise	Commercial rubber
Estuary mudflats + mangroves		Industrial fruit crops
Coastal Sandy Area/sand-dunes		Livestock production
Lagoons and lakes		Shellfish gathering
Inshore marine areas		Fish + shrimp aquaculture
Offshore marine areas		Capture Fishery


Ecological/Biophysical component: **Coastal Sand Dunes and sandy beaches**
Kinh commercial and small-holder aquaculture on coastal sandy areas
Economic component: **Shrimp aquaculture**
Social component: **Kinh** people engaged in a combination of **commercial enterprise and small-holder** activities

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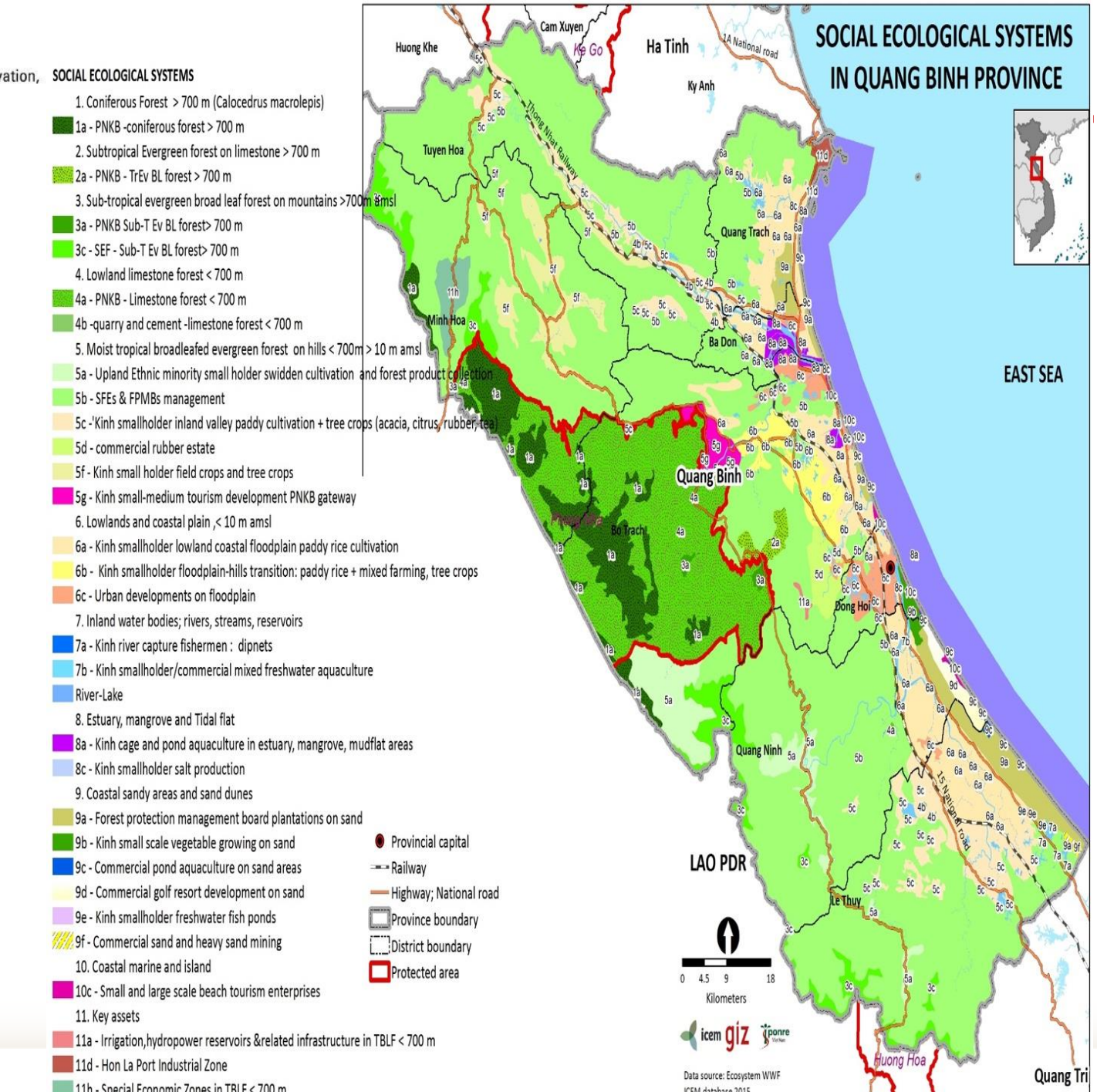
Mapping Socio-ecological systems of Quang Binh Province

Spatially explicit mapping is a key part of studying socio-ecological systems



Prioritisation: 32 SES/KEA Ha Tinh

The SESs were ranked by assigning scores to each system, according to12 selected factors

Code No.	SES Name	Ecological		Social			Economic					Climate/ Environment		Rank
		Provider of ES	Depend on ES	Popu-lation	Poverty	Other Vulnerable Group	direct GDP	Future emphasis (SEDP)	Land use % *<5%; ***>15%	Labour used	Base for Value Addi-tion	Climate damage trends	Neg Environ Impact	
1+2 PA1 PA2	**SUBTROPICAL FOREST >700 M, MOIST TROPICAL FOREST < 700M** State SUF Management (Vu Quang) State SUF Management (Vu Quang, Ke Go)	xxx	xx	x	x	-	x	x	xx 13.5	x	xxx	x	-	3
FPMB1 FPMB2	FPMB on subtropical forest >700m FPMB on moist trop forest< 700m	xxx	x	x	x	x	x	x	xxx 17.4	x	xxx	x	-	6
2 2b	**MOIST TROPICAL FOREST < 700M** Kin/Ethnic minority smallholder field + tree crops	x	xx	xx	xx	x	xx	xx	xx 6.5	xx	x	xx	x	8
2c	Kinh commercial forestry on hill forest (Huong Son and Chuc A LLC)	xx	xx	x	x	-	x	xx	xx 5.5	x	xx	xx	xx	14
2d	Kinh smallholder inland valley paddy cultivation + tree crops (pine acacia, citrus, rubber, tea)	xx	xx	xx	x	-	xx	xx	xxx 15.3	xx	xx	xx	xx	9
2e	EM smallholder inland paddy + field crops + forest product collection	xx	xxx	x	x	x	x	x	x 0.0	x	xx	xx	xx	30
2f	Kinh commercial rubber plantations (Ha Tinh; Huong Khe)	x	x	x	x	-	x	xx	x 4.5	x	x	xx	xx	15

Prioritisation: SES/KEA Quang Binh

No.	SES	Ecological		Social			Economic						Climate/Environment		Rank
		Provider of ES	Depend on ES	Population	Poverty	Other Vulnerable Group	GDP	Future emphasis	% Tri measure	Land used *<5%; ***>20 %	Labour used	Base for VA*	Climate damage trends	Neg Env Impact	
PNKB 1-5	Phong Nha-Ke Bang National Park	xxx	xxx	x	x	x	xx	xxx	16.0	xxx	x	xx	x	-	3
SFE5	State forest enterprise forest management lowland forest	xx	xx	x	x	xx	x	x	15.5	xxx	xx	xxx	x	xx	4
5a	Upland Ethnic minority small holder swidden cultivation and forest product collection	x	xx	x	xxx	xxx	x	x	2.7	x	xx	x	x	xx	8
5b	Kinh smallholder inland valley or transition paddy cultivation + tree crops (acacia, citrus, rubber, tea)	xx	xx	xx	x	x	xx	xxx	12.8	xx	xx	x	xx	xx	1

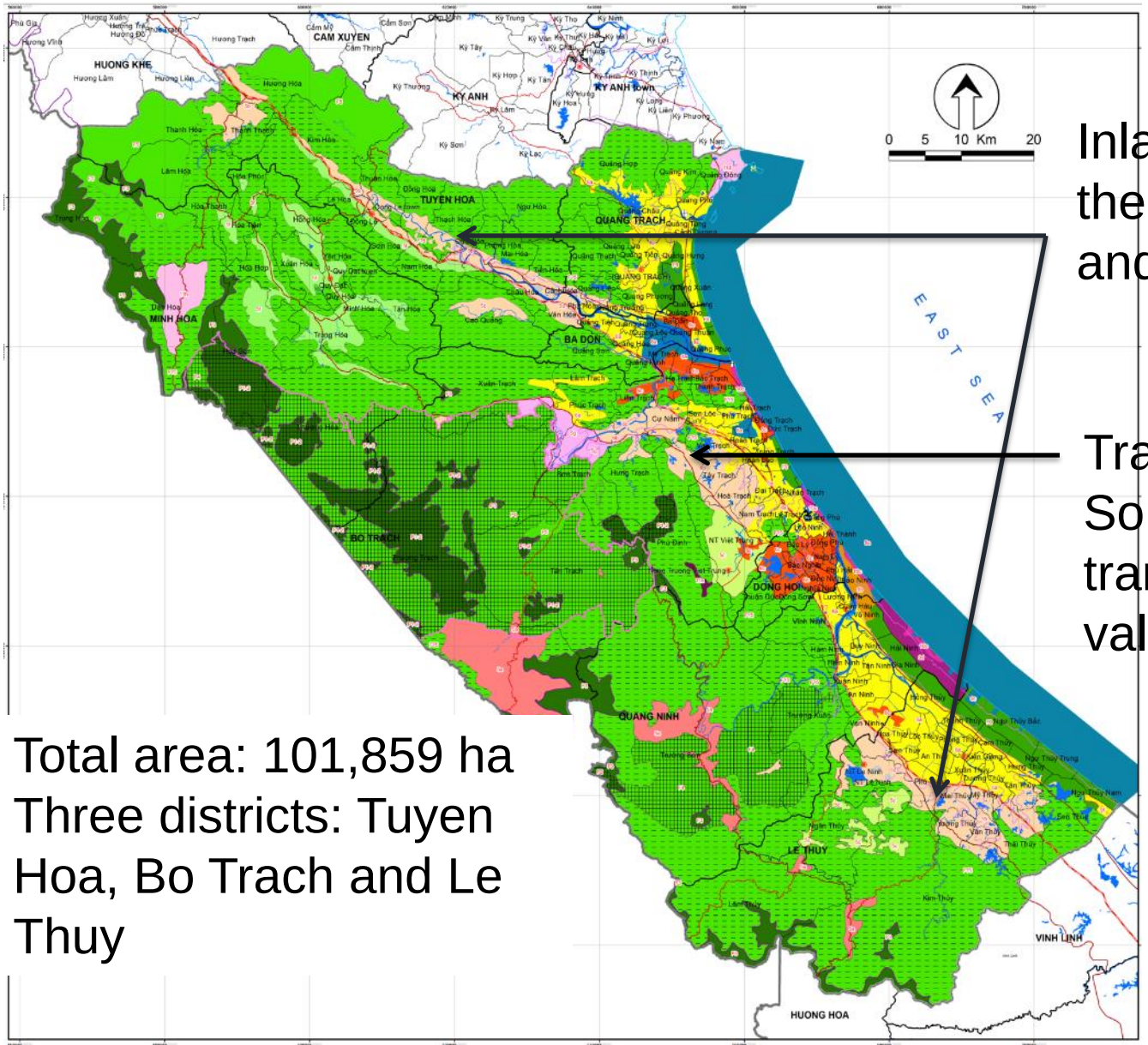
Profiling the socio-ecological systems

- providing an overview of the ecological, social, economic and climatic characteristics of each, an estimation of their relative importance
- considering resilience of the ecosystem component of each SES. Resilience is the capacity of a system to experience shocks while retaining essentially the same function, structure, feedbacks, and therefore identity

Ecosystem services important to people in the upland ethnic minority swidden cultivation SES - example

No	Main Services	Description	Source of ecosystem service	Rank		Justification for ranking
				Imp	Cond	
Direct Provisioning						
P1	food	Forests and some fallows still provide wild foods (wild bananas, bamboo shoots, forest yams, teas) for human or livestock (esp pig) consumption, but quantities are declining and collection distances increasing. Cattle graze freely. Fish are traditionally caught hand nets, but Kinh are now taking all the fish.	Forest in SES itself and surrounding FPMB	3	2	Some wild human foods are important, but primarily in emergency situations.
P2	water	River water is used for all domestic purposes; small streams have dried and levels of main river have declined in last few years. There is no irrigation.	Forested upper parts of SES and FPMB around the SES	5	3	Vital service, increasingly degraded. Villages resettled from riverside to roadside particularly challenged.
P3	medicines	Forests still provide some, the modern health services are also available at the commune centre	Forest and fallow in the SES itself	3	3	People rely on both local herb and modern medicine

Kinh smallholder inland valley/transition mixed paddy field and tree crops



Inland valley: along the valley of Gianh and Dinh rivers

Transition: Along Son, Ron river and transition from valley to hilly area

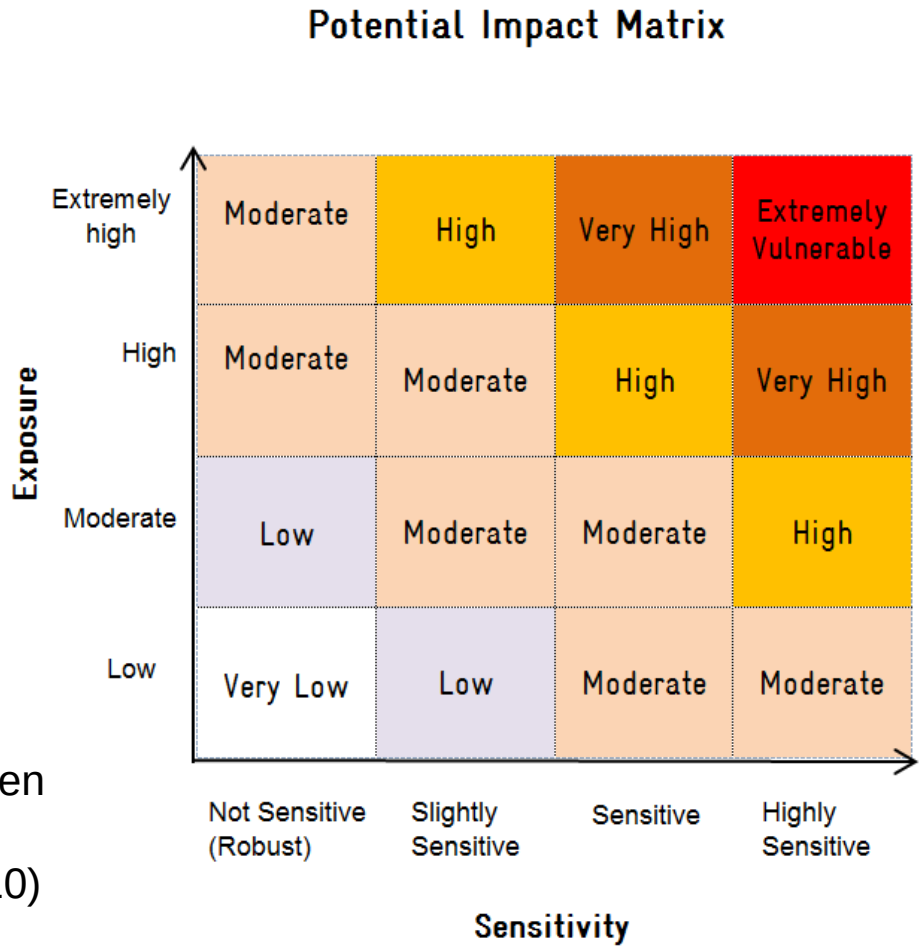
Total area: 101,859 ha
Three districts: Tuyen Hoa, Bo Trach and Le Thuy

Vulnerability Assessment of SESs and KEAs – Modules 2,3 and 4 (partly also 5 and 8)

- Identifying major threats from climate change (7 key parameters of climate change)
- Assessment of impact
- Assessment of the Adaptive Capacity of SES and KEA
- Overall Vulnerability Assessment

Assessment of Climate Impacts (1)

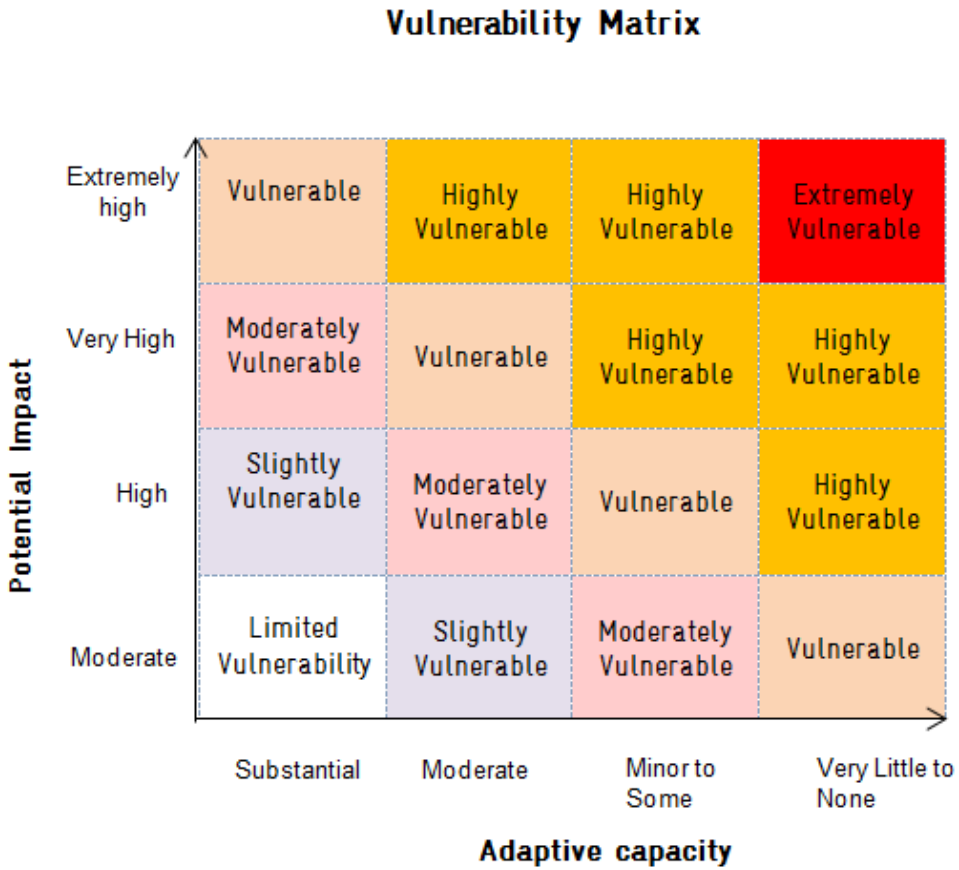
- Scores for exposure and sensitivity of each SES or KEA to each of the seven climate parameters
- Plotting exposure scores against sensitivity scores in a matrix > scores for potential impact of each of the seven selected parameters of climate change for each SES/KEA



Potential Impact Matrix: The relationship between Exposure and Sensitivity in determining the degree of potential impact (Hills & Bennett, 2010)

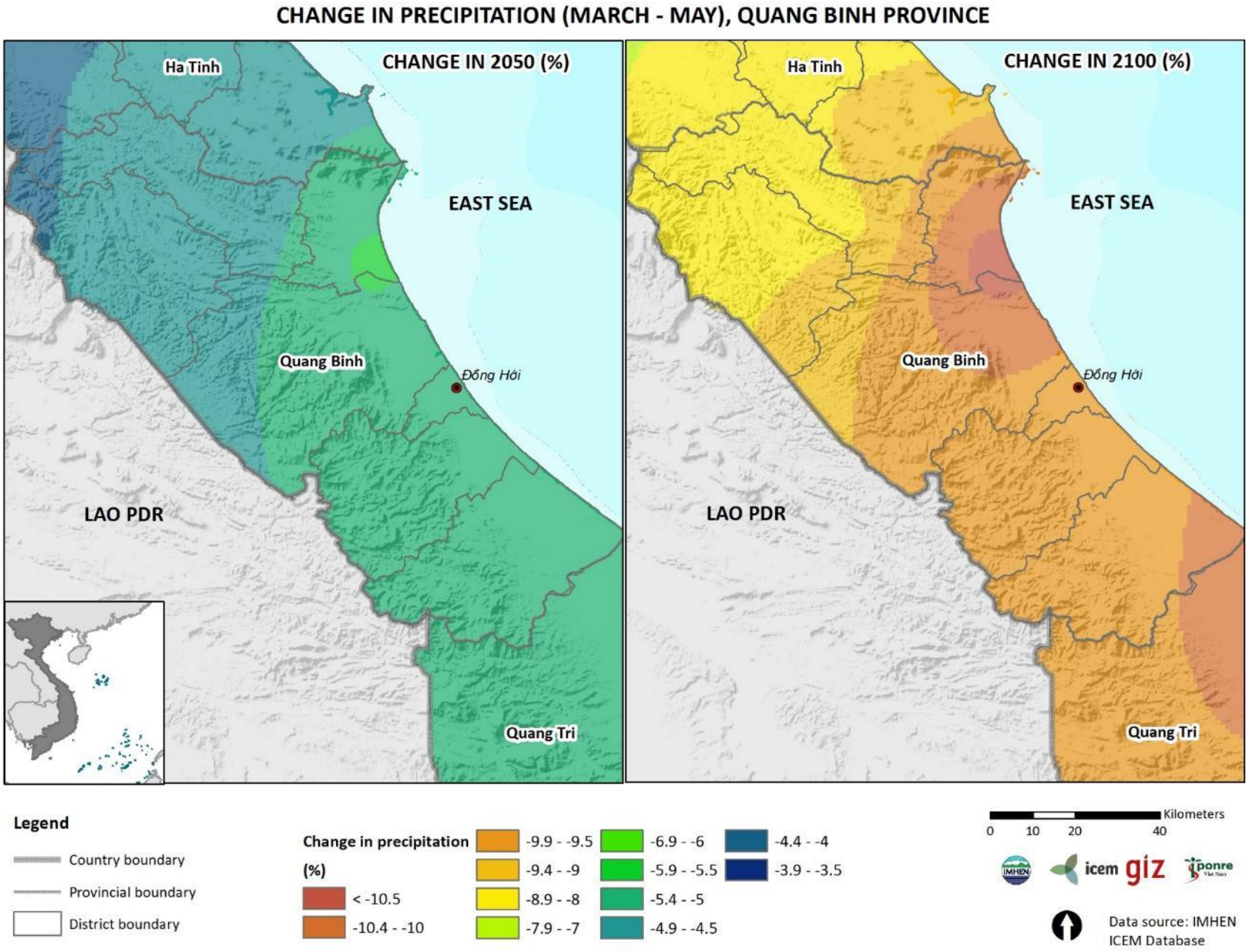
Assessment of Adaptive Capacity and Overall Vulnerability

- Scores for adaptive capacity of each SES or KEA to each of the seven climate parameters
- Overall Vulnerability Assessment

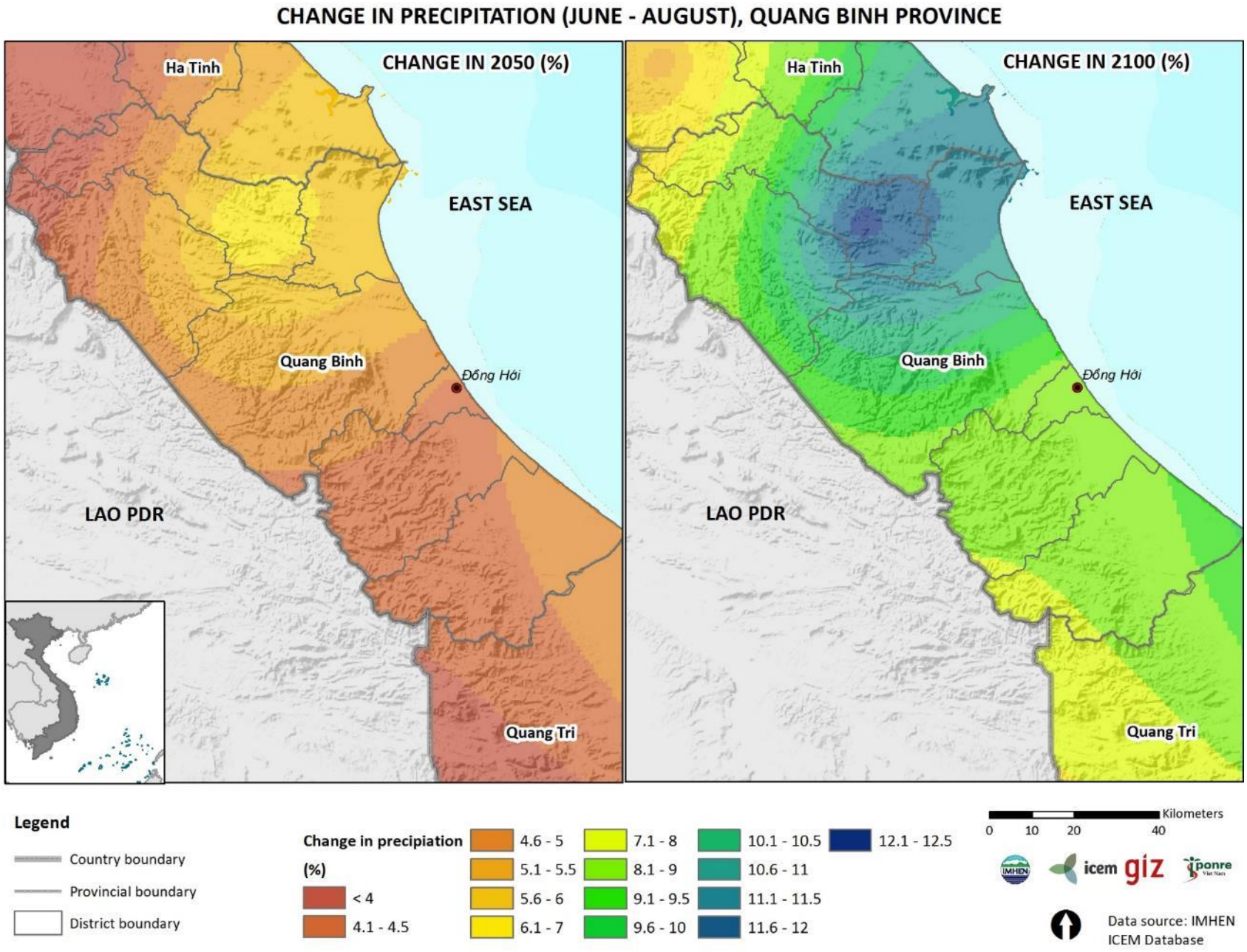


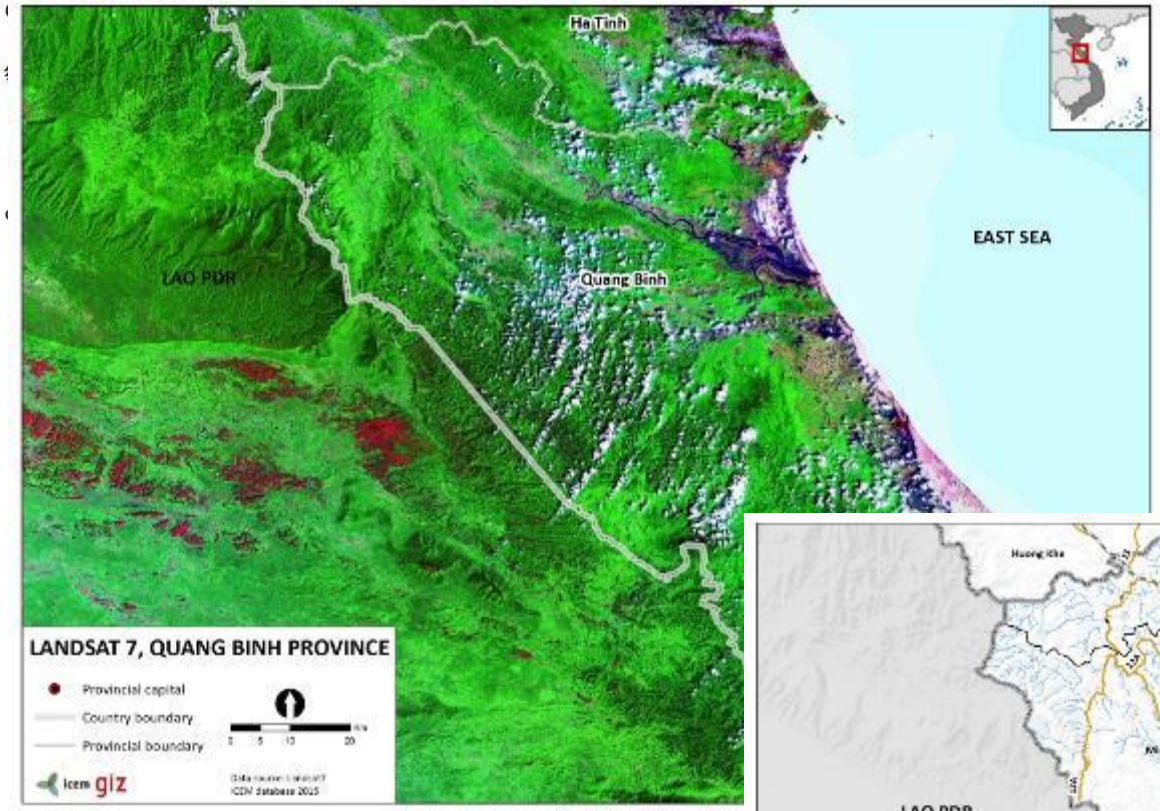
Vulnerability matrix: the relationship between potential impact and adaptive capacity in determining the degree of ecological vulnerability (Hills & Bennett 2010)

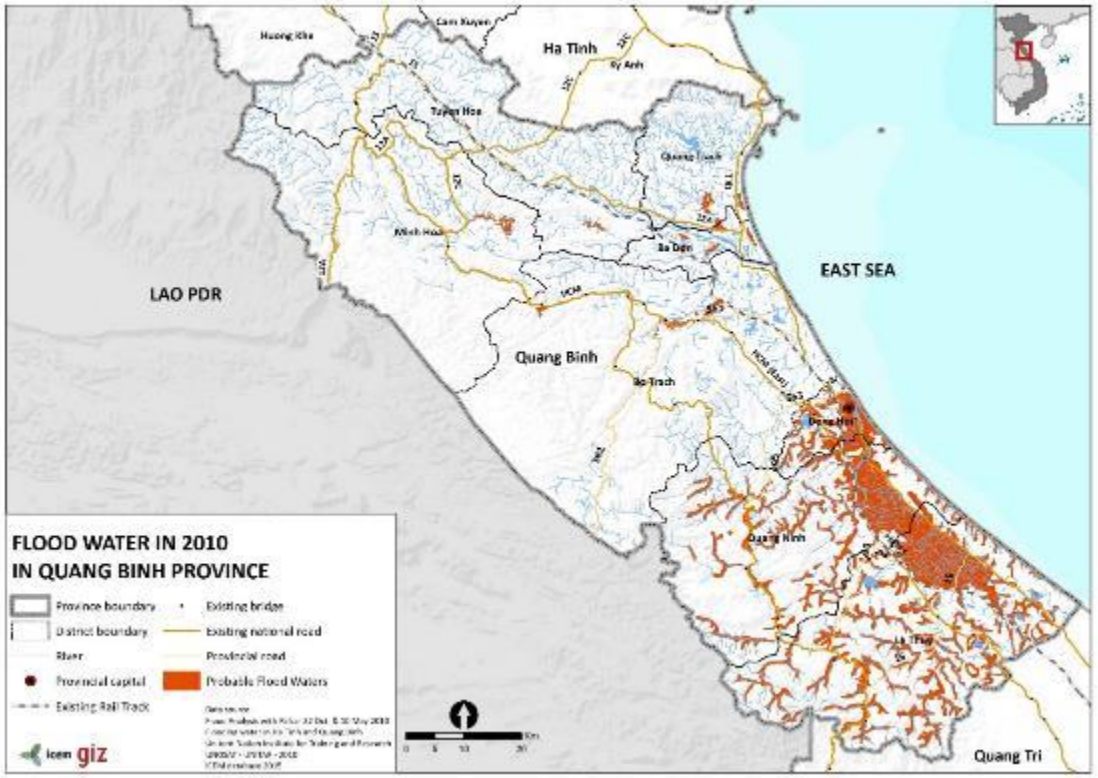
Climate change – Rainfall change



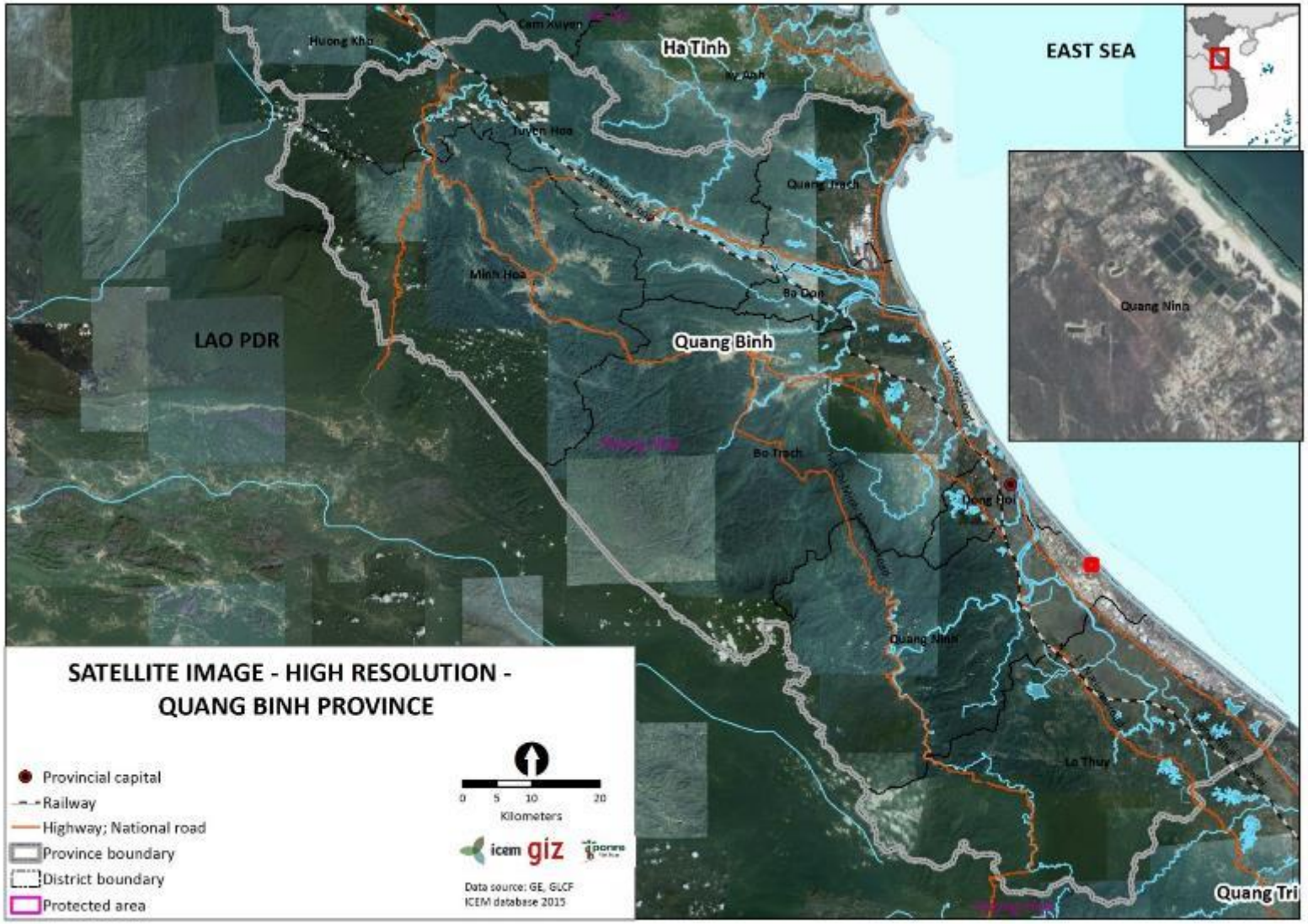
Climate change – Rainfall change




Ha Tinh
EAST SEA
LAO PDR
Quang Binh
LANDSAT 7, QUANG BINH PROVINCE
Provincial capital
Country boundary
Provincial boundary
icem giz


Ha Tinh
EAST SEA
LAO PDR
Quang Binh
Quang Tri
FLOOD WATER IN 2010
IN QUANG BINH PROVINCE
Province boundary
District boundary
River
Provincial capital
Existing Rail Track
Existing bridge
Existing national road
Provincial road
Probable Flood Waters
icem giz

floods



High resolution satellite pictures

Rainfall Change in SES/KEA

SES CODE	Rainfall change (6-8) in 2050 (%)			Rainfall change (6-8) in 2100 (%)			Rainfall change (3-5) in 2050 ((%)			Rainfall change (3-5) in 2100 (%)			Rainfall change (9-11) in 2050			Rainfall change (9-11) in 2100		
	MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN	MIN	MAX	MEAN
1a	4.9	5.0	5.0	9.4	9.5	9.5	-5.3	-5.2	-5.3	-10.1	-10.1	-10.1	3.8	4.0	3.9	7.4	7.6	7.5
2a	4.4	5.4	4.7	8.5	10.3	9.0	-5.5	-5.1	-5.2	-10.5	-9.7	-9.9	2.4	3.0	2.6	4.6	5.8	5.1
3a	4.6	4.7	4.7	8.8	9.0	8.9	-5.2	-5.1	-5.1	-9.9	-9.9	-9.9	2.8	2.8	2.8	5.4	5.4	5.4
4a	3.9	5.4	4.8	7.4	10.3	9.2	-5.1	-4.5	-4.8	-9.8	-8.6	-9.2	3.2	3.4	3.4	6.1	6.6	6.5
5a	3.4	4.7	4.2	6.5	9.0	8.0	-5.2	-4.3	-4.9	-9.9	-8.3	-9.4	3.2	4.2	3.5	6.1	8.1	6.7
5c	4.4	6.1	5.3	8.5	11.7	10.1	-5.1	-5.0	-5.1	-9.9	-9.6	-9.7	3.1	3.3	3.2	6.1	6.4	6.2
6a	4.5	4.8	4.6	8.7	9.2	8.9	-5.2	-5.1	-5.2	-10.0	-9.8	-9.9	2.6	2.8	2.7	4.9	5.3	5.2
6b	4.3	6.4	5.2	8.3	12.3	10.0	-4.8	-4.6	-4.6	-9.1	-8.8	-8.9	3.0	3.3	3.2	5.8	6.4	6.2
8a	4.4	6.0	5.0	8.4	11.4	9.7	-5.6	-5.0	-5.2	-10.7	-9.6	-10.0	2.4	3.7	3.0	4.6	7.1	5.7
9a	4.7	5.5	5.1	9.0	10.5	9.8	-5.4	-5.2	-5.3	-10.4	-10.0	-10.2	2.6	3.0	2.8	5.0	5.8	5.3
9b	4.4	5.7	4.9	8.4	11.0	9.4	-5.6	-5.1	-5.3	-10.8	-9.7	-10.1	2.4	3.1	2.7	4.6	6.0	5.1
9c	4.4	5.8	5.1	8.5	11.1	9.8	-5.6	-5.1	-5.3	-10.8	-9.8	-10.1	2.4	3.9	2.9	4.6	7.6	5.6
11a	4.9	5.0	4.9	9.3	9.6	9.5	-5.2	-5.2	-5.2	-10.1	-9.9	-10.0	2.8	3.0	2.9	5.4	5.8	5.6
10c	4.1	4.4	4.3	7.9	8.4	8.2	-4.6	-4.5	-4.5	-8.8	-8.7	-8.7	3.2	3.4	3.3	6.2	6.5	6.3
Wa	4.3	6.3	5.1	8.3	12.1	9.8	-5.6	-4.7	-5.2	-10.8	-8.9	-10.0	2.4	4.0	3.0	4.6	7.7	5.8

Determining Impact

		***E**xposure of system to climate threat*				
		1 Very Low	***2 Low***	***3 Medium***	***4 High***	***5 Very High***
***S**ensitivity of system to climate threat*	***5 Very High***	*Medium*	*Medium*	*High*	*Very High*	*Very High*
	4 High	*Low*	*Medium*	*Medium*	*High*	*Very High*
	3 Medium	*Low*	*Medium*	*Medium*	*High*	*Very High*
	2 Low	*Low*	*Low*	*Medium*	*Medium*	*High*
	1 Very Low	*Very Low*	*Low*	*Low*	*Medium*	*High*

Determining Vulnerability

		Impact				
		1- Very Low Inconvenience (days)	2- Low Short disruption to system function (weeks)	3- Medium Medium term disruption to system function (months)	3- High Long term damage to system property or function (years)	5- Very High Loss of life, livelihood or system integrity
Adaptive Capacity	1- Very Low Very limited institutional capacity and no access to technical or financial resources	Medium	Medium	High	Very High	Very High
	2- Low Limited institutional capacity and limited access to technical and financial resources	Low	Medium	Medium	High	Very High
	3- Medium Growing institutional capacity and access to technical or financial resources	Low	Medium	Medium	High	Very High
	4- High Sound institutional capacity and good access to technical and financial resources	Low	Low	Medium	Medium	High
	5- Very High Exceptional institutional capacity and abundant access to technical and financial resources	Very Low	Low	Low	Medium	High

Some examples: Ten most important SESs in Quang Binh and their vulnerability scores

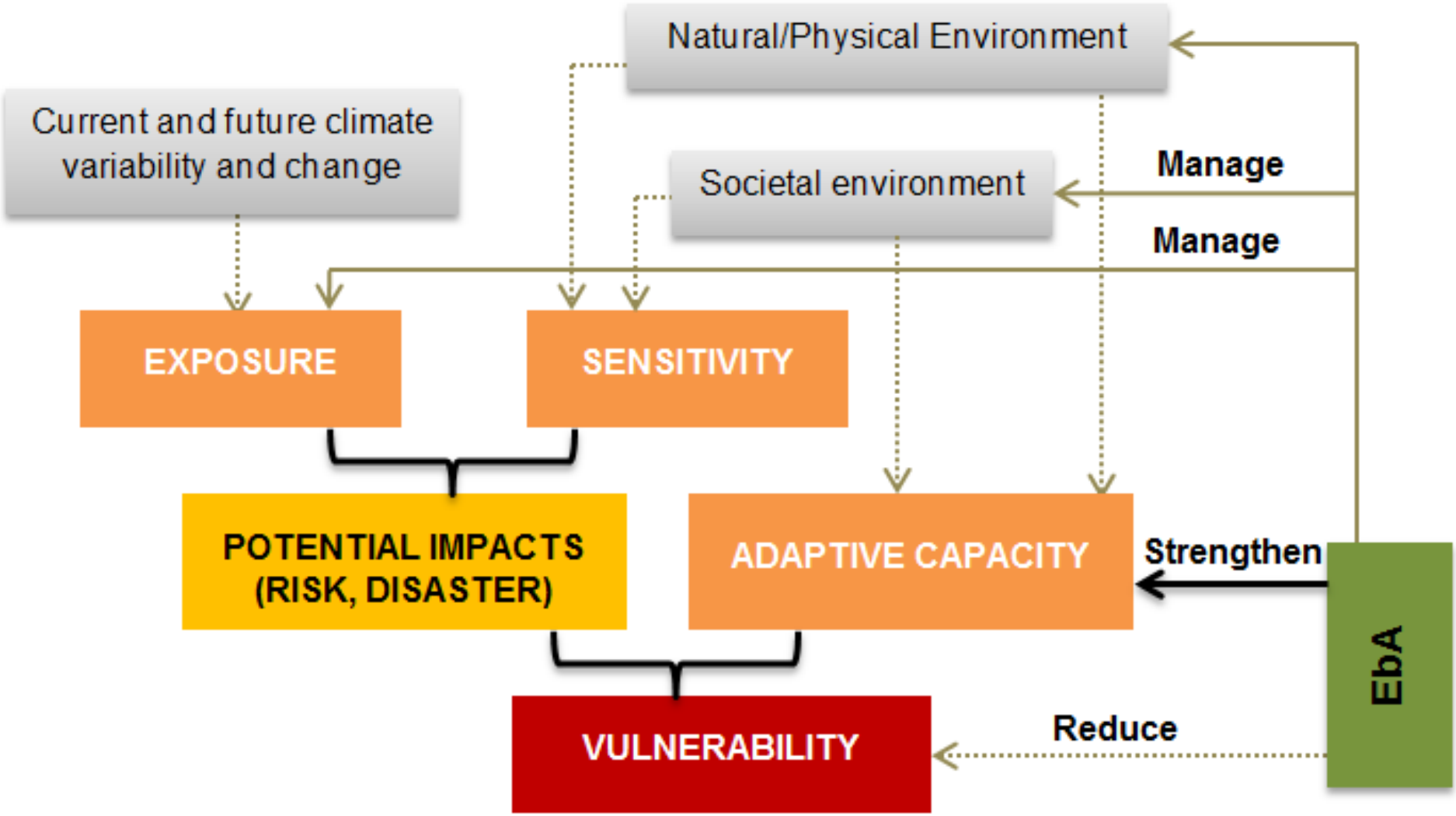
SES Importance Rank	Name of SES	Mean vulnerability score for 7 climate factors	Vulnerability Rank
8	Upland Ethnic minority swidden cultivation	4.0	1
2	Kinh smallholder mixed paddy and tree crops	3.4	2
1	Kinh smallholder coastal floodplain irrigated paddy rice cultivation	3.4	2
10	Irrigation/ hydropower reservoirs and related infrastructure	3.3	4
5	Kinh small-holder/commercial shrimp aquaculture on sand dunes	3.3	4
7	Kinh inshore capture fishermen (estuary to 6 km offshore)	3.1	6
6	Forest PMB on coastal sand dunes and sand	3.1	6
9	Hilly forest commercial rubber estates	2.8	8
3	Phong Nha-Ke Bang NP and WHS	2.7	9
4	Lowland Moist TRF State Forest Enterprise	2.7	9

Identifying EbA and other Adaptation Options – partly Module 5, NOT Module 6 and 7

The approach to identifying adaptation options is as follows

- Review most important SESs/KEAs (in regards to vulnerability)
- Identify where adaptation responses are needed
- Define ecosystem-based and other adaptation options
- Prioritise options
- Identify synergies (packages of interventions)

Conceptual framework: EbA



Source: adapted from GIZ, Adelphi and EURAC 2013, based on IPCC, 2007

Criteria used to rank adaptation interventions (adapted from IUCN, Marshall et al. 2009)

CRITERIA FOR ADAPTION	DESCRIPTION	ACTION
Need	Individuals, communities and sectors will vary in the extent and immediacy of their vulnerability to climate change	Decision-makers should rank candidates for adaptation using transparent methods for equitable resource allocation. They should establish clear criteria for evaluating need and recognising urgency in adaptation.
Benefit	Benefits of adaptation actions will vary considerably between actors - can assist with decisions between sectors/regions in which to invest in adaptation action.	Prioritising groups/regions should be done with the development of clear criteria for evaluating benefit- through comparative assessments of economic/social/environmental value
Scale of Impact	Some interventions may only have an impact at a very local scale, whereas others may have a much broader impact	Prioritisation and decision-making should take into account the scale of the impact
Feasibility	Some adaptation options can be infeasible in practice. Reducing vulnerabilities might be economically/technically/politically too challenging.	Feasibility analysis will help identify strategies which are more practicable. In instances where this is difficult to evaluate- risk-based approach can help with decision making in the face of uncertainty
Costs	Adaptation options vary greatly in cost - inexpensive options may deliver major benefits with great certainty.	Weighing up costs against feasibility and likely benefits. Decision makers should consider the nature of the vulnerability, the type of adaptation strategy and the institutional context of the adaptation initiative

Some examples: EbA and related interventions for priority SESs in Quang Binh

#	INTERVENTION	SES	LEAD	Time frame	Priority
1	Implement strict enforcement against illegal logging and wildlife poaching	PNKB 1-5 SFE 5	PNKB MB and Forest Companies	S-M	1
2	Improve forest fire prevention, including through education	PNKB 1-5 SFE 5	PNKB MB and Forest Companies	M-L	2
3	Restore degraded/previously logged areas with important/high value native species suitable to changing climate	PNKB 1-5 SFE 5	PNKB MB and Forest Companies	M-L	2
4	Conduct research on comfort zones and tolerance thresholds of endemic, endangered, and high value species	PNKB 1-5 SFE 5	PNKB MB and Forest Companies	L	3
5	Improve visitor education and interpretation services	PNKB 1-5	PNKB MB	S-M	3
6	Improve outreach with buffer zone communities	PNKB 1-5	PNKB MB	S-M	2
7	Update harvesting plans taking into account climate change issues	SFE5	Forest companies	M-L	2
8	Prepare for FSC Certification of additional natural forest not yet certified	SFE5	Forest companies	M	1
9	Plan transition to shift acacia plantations from 6-7year rotation to 15 year + rotation for production of higher value timber products	SFE5	Forest companies	M-L	1
10	Improve soil and water conservation practices especially on steep slopes where field crops are grown, through contour planting, alley cropping, mulching, etc.	5a	DARD extension services	S	1
11	Conduct enrichment planting of high value timber and NTFPs in community managed forests	5a	DARD extension services	M	2

Lesson Learned

- Structured approach to designing and implementing multi-scalar vulnerability assessments of complex systems for EbA
- Innovative in proposing to implement province-wide vulnerability assessments, and to identify specific socio-ecological systems and then use them as the entry point for impact assessment.
- Level of complexity needs to be balanced with the need to develop an approach that is understandable and replicable by provincial authorities
- Participation of local stakeholders in understanding and being involved in the process should be enhanced as a form of capacity building
- Challenges in obtaining up-to-date data

Recommendations for VA Sourcebook

When applying the VA Sourcebook to an EbA context, it is useful to:

- Promote the SES approach
- Provide or point out a methodology for identifying an SES and assessing impacts of climate change on SESs
- Make clear on which scale the sourcebook can be used, and if it can be used on multiple levels, provide guidance as to how to use it on these different levels
- Emphasize the link between/dependency of humans, their livelihoods on ecosystems as a core element of the assessment

Thank You