Technical Session 21: Towards Rural Resilience to Climate Change

Climate Vulnerability And Farmer's Adaptation Strategies : A Case Study from Singkarak Lake Basin in West Sumatera, Indonesia

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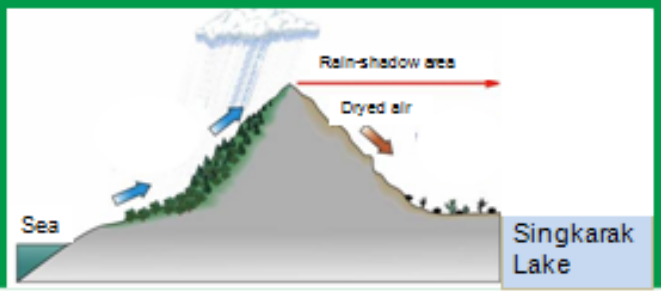
01-03 July 2015 – AIT, Thailand

Introduction

Research background and problems:

- The surrounding of Singkarak Lake in West Sumatera have been intensively studied by various experts from various disciplines for almost three decades.
- The issues varies from deforestation in the catchment area, fragile land in the hilly areas, water scarcity in the irrigated and unirrigated paddy-fields, and the degradation of endemic fish species (*ikan bilih*) in the Lake Singkarak.
- PEER-USAID have granted the research team at Andalas University to study about the climate change and natural resources management in the surrounding Singkarak lake from june 2012 to Mei 2015. One of the main concern of this research is about the agricultural and livelihood changes in the surrounding Singkarak. The region in the surrounding Singkarak Lake is located in the rain-shadow area (*daerah bayang-bayang hujan*) which usually dried and have uncertainty of rainfall.



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The Study Site:

5 Nagaris (villages) in the Surrounding Singkarak Lake, West Sumatera.

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Research Objectives

1. *To analyze the empirical facts of climate changes in the study site*
2. *To measure the climate vulnerability of the study sites to the climate changes*
3. *To identify livelihood changes and local adaptive strategies.*

Methodology

Combining qualitative and quantitative approaches

- Analyzing climate variability using rainfall data from the nearest stations
- Measuring the vulnerability index using IPCC concepts; through Exposure Index (EI), Sensitivity Index (SI) and Adaptive Capacity Index (ACI) by applying Focused Group Discussion, Field observation and Secondary data analysis for 5 of 13 Nagaris (villages) in the surrounding Singkarak Lake.
- Identify livelihood changes and adaptive action of local people through FGD

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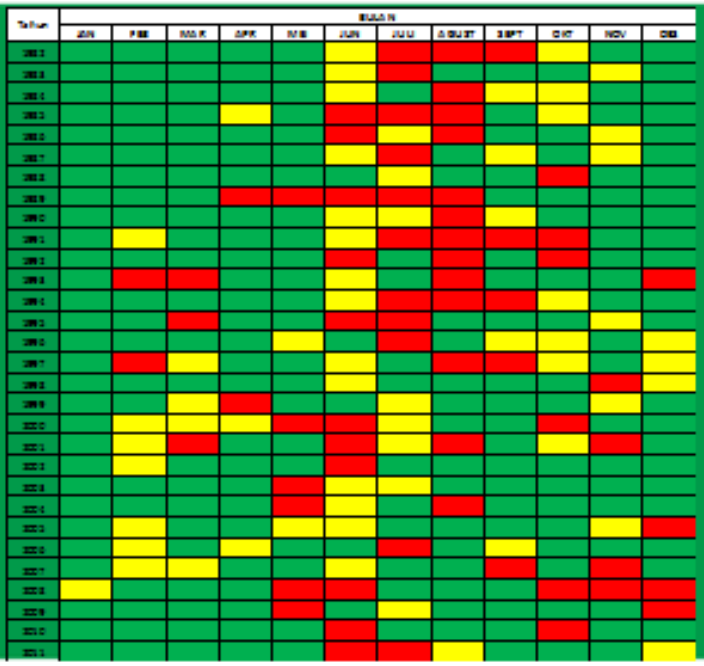
Climate analysis

- Changes pattern of wet and dry season since 1990s
- Uncertainty of rainfall to decide planting season and crops



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Farmers perception on Climate changes:

- *Previously, -er months were relatively high rainfall – but not commonly happened now.*
- *Previously, rainfall season (long rainfall period) could be predicted, but today is uncertain*
- *Local term "cewang di langik tando ka paneh, gabak di hulu tando ka hujan" this local indication of rainfall did not common any more, the wind can easily wipe the rainfall cloud.*
- *Previously, the rainfall season could end upto the harverst time, but, today, the season could end by two months only.*
- *Many spring water sources in the upper catchment, especially in the eastern part of Singkarak have been dried out.*

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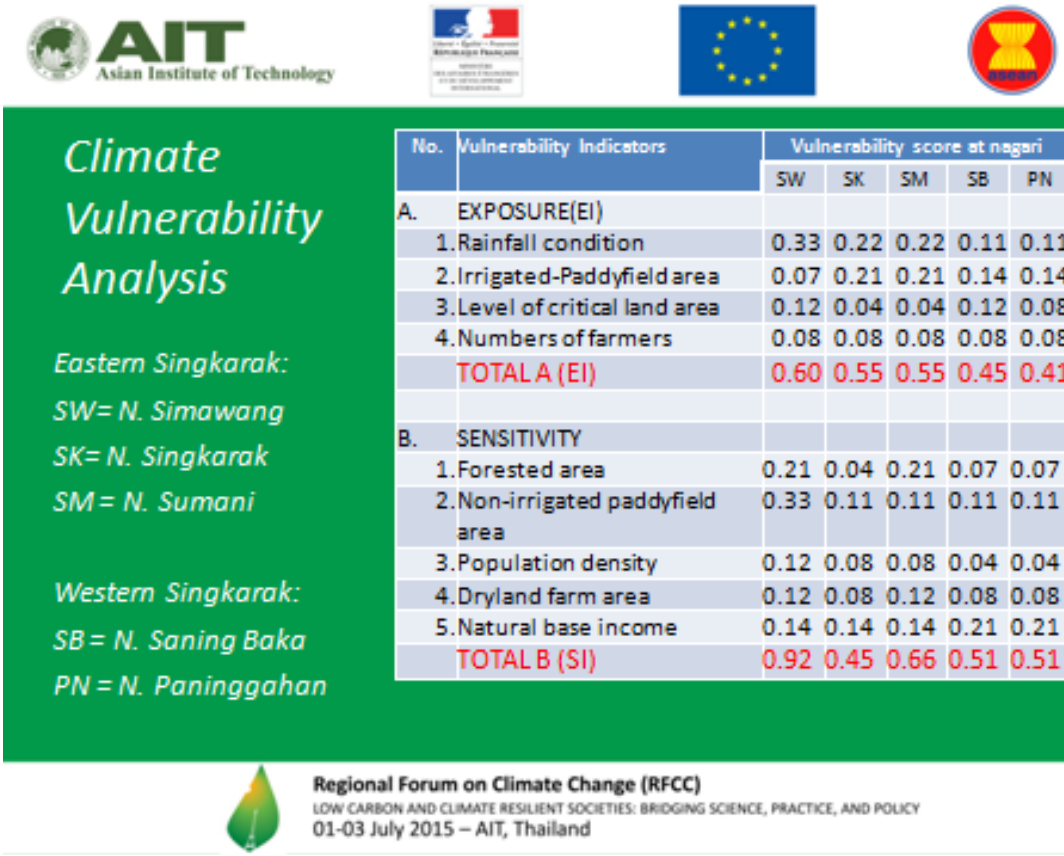
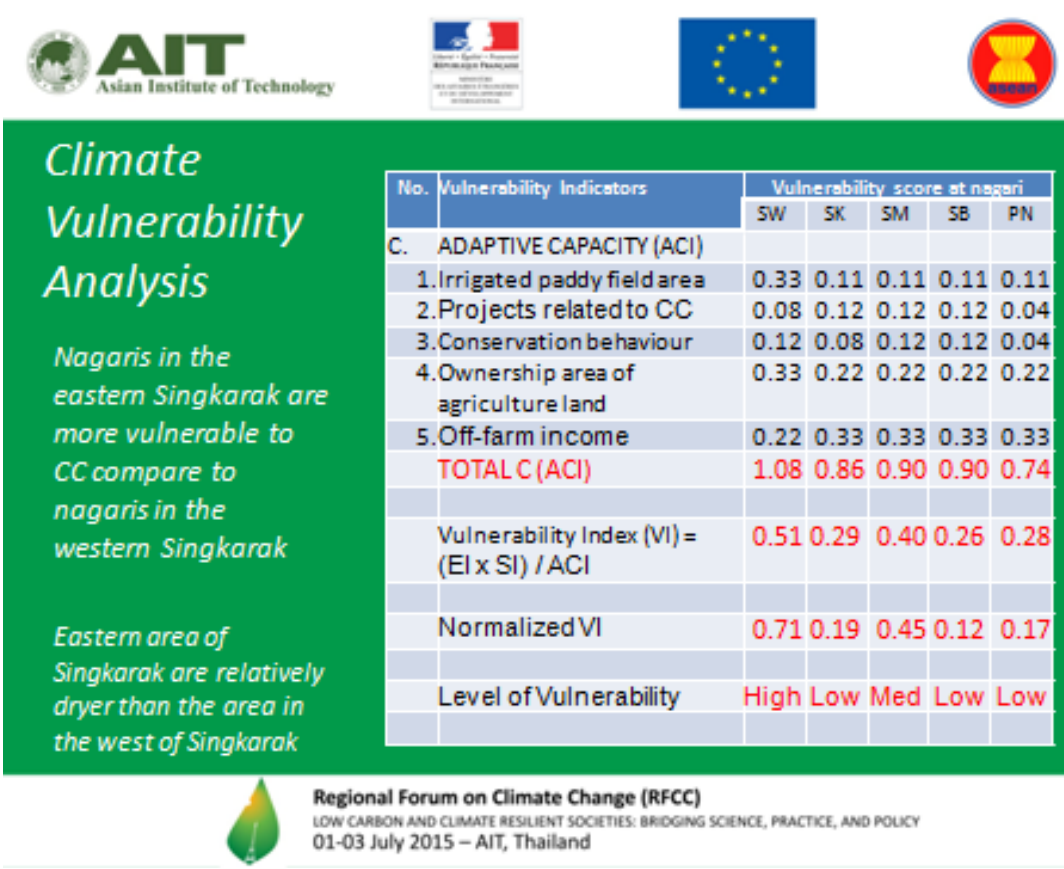


No.	Vulnerability Indicators	Vulnerability score at nagari				
		SW	SK	SM	SB	PN
A.	EXPOSURE(EI)					
1.	Rainfall condition	0.33	0.22	0.22	0.11	0.11
2.	Irrigated-Paddyfield area	0.07	0.21	0.21	0.14	0.14
3.	Level of critical land area	0.12	0.04	0.04	0.12	0.08
4.	Numbers of farmers	0.08	0.08	0.08	0.08	0.08
	TOTAL A (EI)	0.60	0.55	0.55	0.45	0.41
B.	SENSITIVITY					
1.	Forested area	0.21	0.04	0.21	0.07	0.07
2.	Non-irrigated paddyfield area	0.33	0.11	0.11	0.11	0.11
3.	Population density	0.12	0.08	0.08	0.04	0.04
4.	Dryland farm area	0.12	0.08	0.12	0.08	0.08
5.	Natural base income	0.14	0.14	0.14	0.21	0.21
	TOTAL B (SI)	0.92	0.45	0.66	0.51	0.51



No.	Vulnerability Indicators	Vulnerability score at nagari				
		SW	SK	SM	SB	PN
C.	ADAPTIVE CAPACITY (ACI)					
1.	Irrigated paddy field area	0.33	0.11	0.11	0.11	0.11
2.	Projects related to CC	0.08	0.12	0.12	0.12	0.04
3.	Conservation behaviour	0.12	0.08	0.12	0.12	0.04
4.	Ownership area of agriculture land	0.33	0.22	0.22	0.22	0.22
5.	Off-farm income	0.22	0.33	0.33	0.33	0.33
	TOTAL C (ACI)	1.08	0.86	0.90	0.90	0.74
	Vulnerability Index (VI) = (EI x SI) / ACI	0.51	0.29	0.40	0.26	0.28
	Normalized VI	0.71	0.19	0.45	0.12	0.17
	Level of Vulnerability	High	Low	Med	Low	Low

Impacts and local adaptive strategies

Impacts on farming

Input factors	Farming Process	Outputs factors	Outcome
• Decrease of water availability during dry period • Flooding in some areas during wet period	• Reducing land vertility • Influenced plant fisiology • Influenced the planting schedule and crops. • Increasing the plant diseases and pests, • Forest fire in some parts	• Reducing land productivity • Reducing farmers' income	• Reducing food availability • Reducing income and consumption level • Migration to urban areas

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Local Adaptation strategies - in 5 nagaris:

SW: Simawang
SK: Singkarak
SM: Sumani
SB: Saningbaka
PN: Paninggahan

Adaptive actions	SW	SK	SM	SB	PN
1. Rehabilitation of natural reservoir	V				
2. Using small pumps inside the ricefield	V	V	V		
3. Changing the cropping pattern	V	V	V	V	V
4. Changing suitable crops - cassava	V	V	V	V	V
5. Practicing low water cultivation techn.	V	V	V	V	V
6. Using local varieties, water resistant	V	V	V	V	V
7. Shifing the planting time	V	V	V	V	V
8. Raising cattle farms	V				
9. Increasing crop intensity in dryland farms	V	V			
10. Participate in Climate Farms School	V				
11. Participate in forest rehabilitation	V	V	V	V	V
12. Participate in Forest firefighter groups				V	
13. Working in off farm business/trade	V				
14. Migrate to urban areas	V				

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Government Involvements to Farmers' Adaptation

Adaptive actions	Not	Yes	Gov't inst.
1. Rehabilitation of natural reservoir		V	Public Work
2. Using small pumps inside the ricefield	V		
3. Changing the cropping pattern	V		
4. Changing suitable crops - cassava	V		
5. Practicing low water cultivation techn.		V	Agriculture Off.
6. Using local varieties, water resistant	V		
7. Shifing the planting time	V		
8. Raising cattle farms	V	V	Agriculture Off
9. Increasing crop intensity in dryland farms	V		
10. Participate in Climate Farms School		V	Agriculture Off.
11. Participate in forest rehabilitation		V	Agriculture Off.
12. Participate in Forest firefighter groups		V	Agriculture Off.
13. Working in off farm business/trade		V	
14. Migrate to urban areas	V		

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Conclusions

1. The facts of Global Warming have influeced the local climate variability in the surrounding Singkarak lake, especially the seasonal pattern of its rainfall and create uncertainty for their planting seasong and crop choices
2. The nagaris in the eastern of Singkarak are more vulnerable to CC compare to nagaris in the west of Singkarak
3. Various adaptive actions/strategies have been implemented by affected farm HH, such as raising cattle, working as farm labour, small trading and migrate to the nearest urban areas.
4. Local government have tried to help them with various programs from public works and also agriculture agencies

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