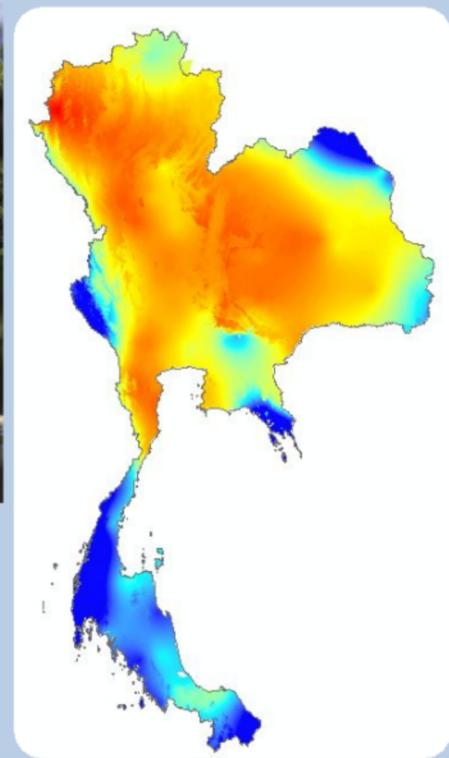


The importance of land use-climate change interaction in building coastal resilience and sustainability

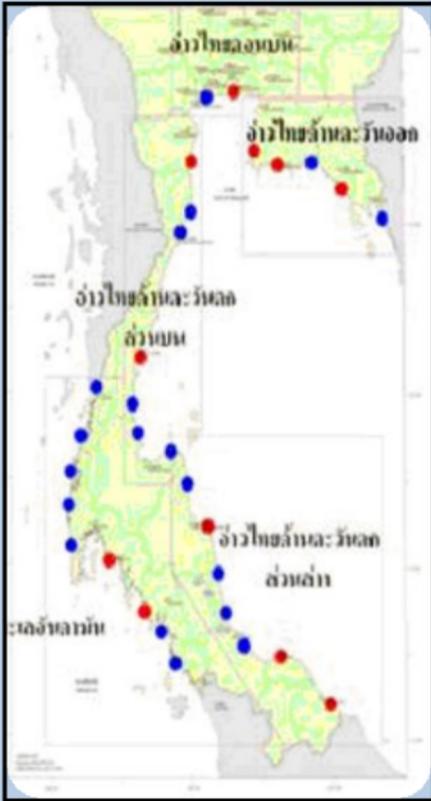


Sathaporn Monprapussorn

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Topics

- Introduction
- Climate change projection
- Land use change projection
- Conclusion



Introduction

- Coastal erosion (78.19 % of coastline)
- More impact of coastal erosion on Gulf of Thailand coastline
- Shrimp farming, resort, hotel and tourism activity, groundwater pumping



Introduction

Mangrove forest in Thailand

3680 km² (1961) ----> 1736 km² (1991) ----> 2336 km² (2004)
-----> 2455 km² (2015)

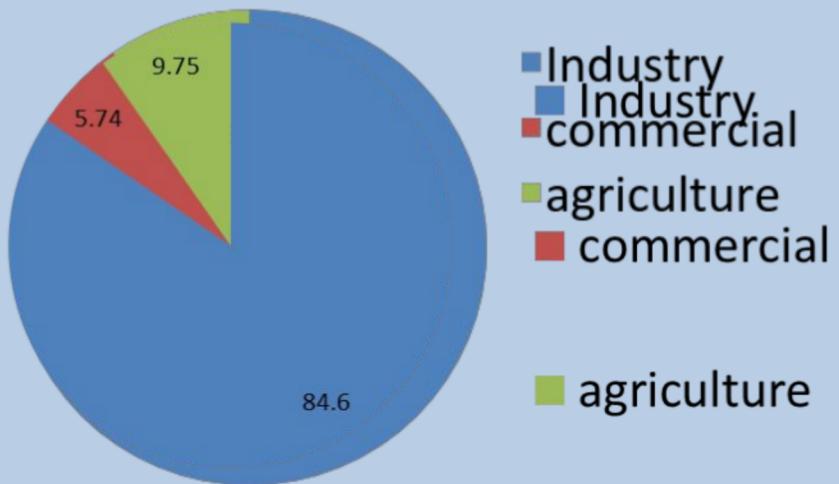
Samut Sakhon

185 km² (1966) -----> 17 km² (2004) -----> 40 km²



Introduction

- Shrimp farming
- Tourism
- Urbanization
- Agricultural expansion
- Mangrove may in fact one of our defense to climate change and global warming.

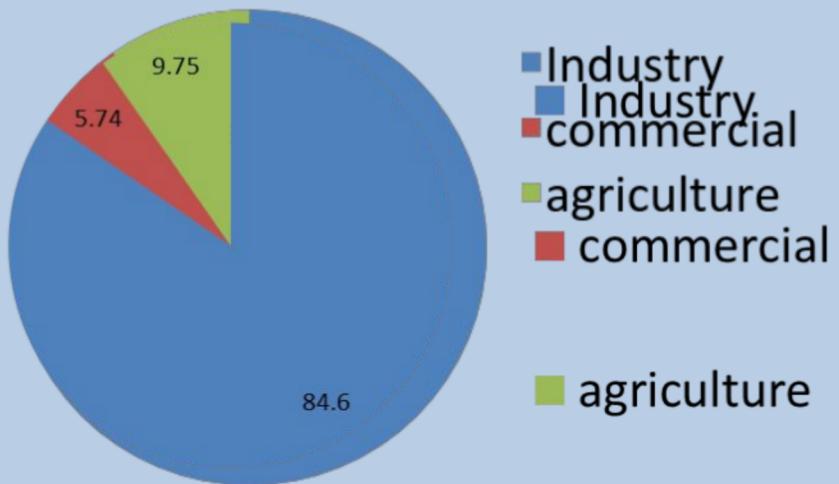


■ Industry
■ Industry
■ commercial
■ agriculture
■ commercial
■ agriculture



Introduction

- Shrimp farming
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- Agricultural expansion
- Mangrove may in fact one of our defense to climate change and global warming.



■ Industry
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■ agriculture



Climate change scenarios

- Monthly precipitation and temperature in 1960-2000 (base line) and 2050
- WorldClim (HadGEM-ES) 30 seconds resolution
- Observe the future trend of climate change a province.

The screenshot shows the homepage of the WorldClim website. The header features a yellow-to-red gradient background with the text "WorldClim - Global Climate Data" and "Free climate data for ecological modeling and GIS". A "Contact" button is visible. The main content area has a white background and contains the text "WorldClim", a description of the dataset, and information about the new Version 2.0.

WorldClim

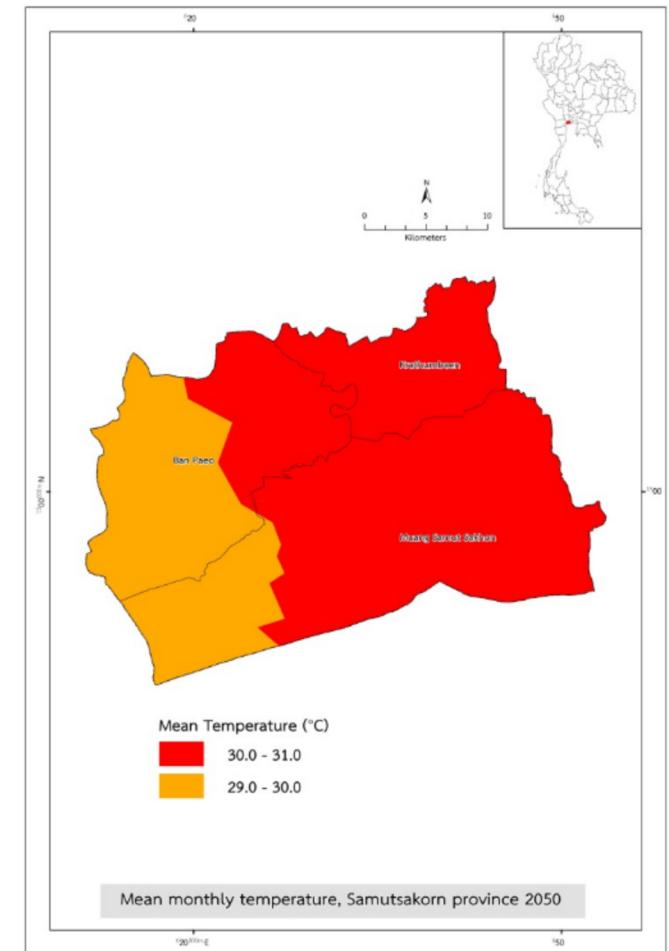
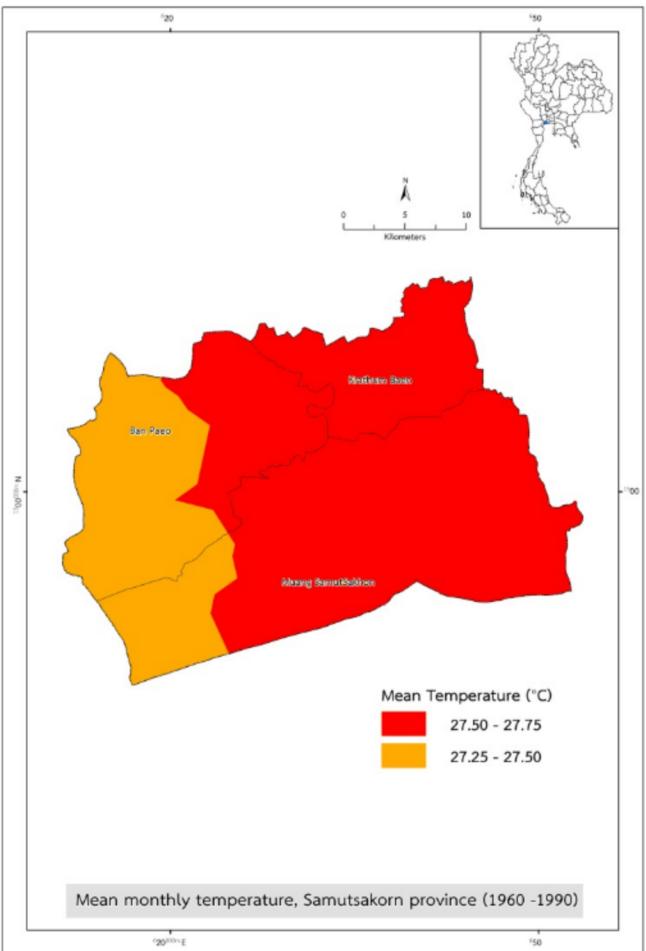
WorldClim is a set of global climate layers (gridded climate data) with a spatial resolution of about 1 km². These data can be used for mapping and spatial modeling.

The *new* **Version 2.0** is now available (current climate only --- more coming soon)

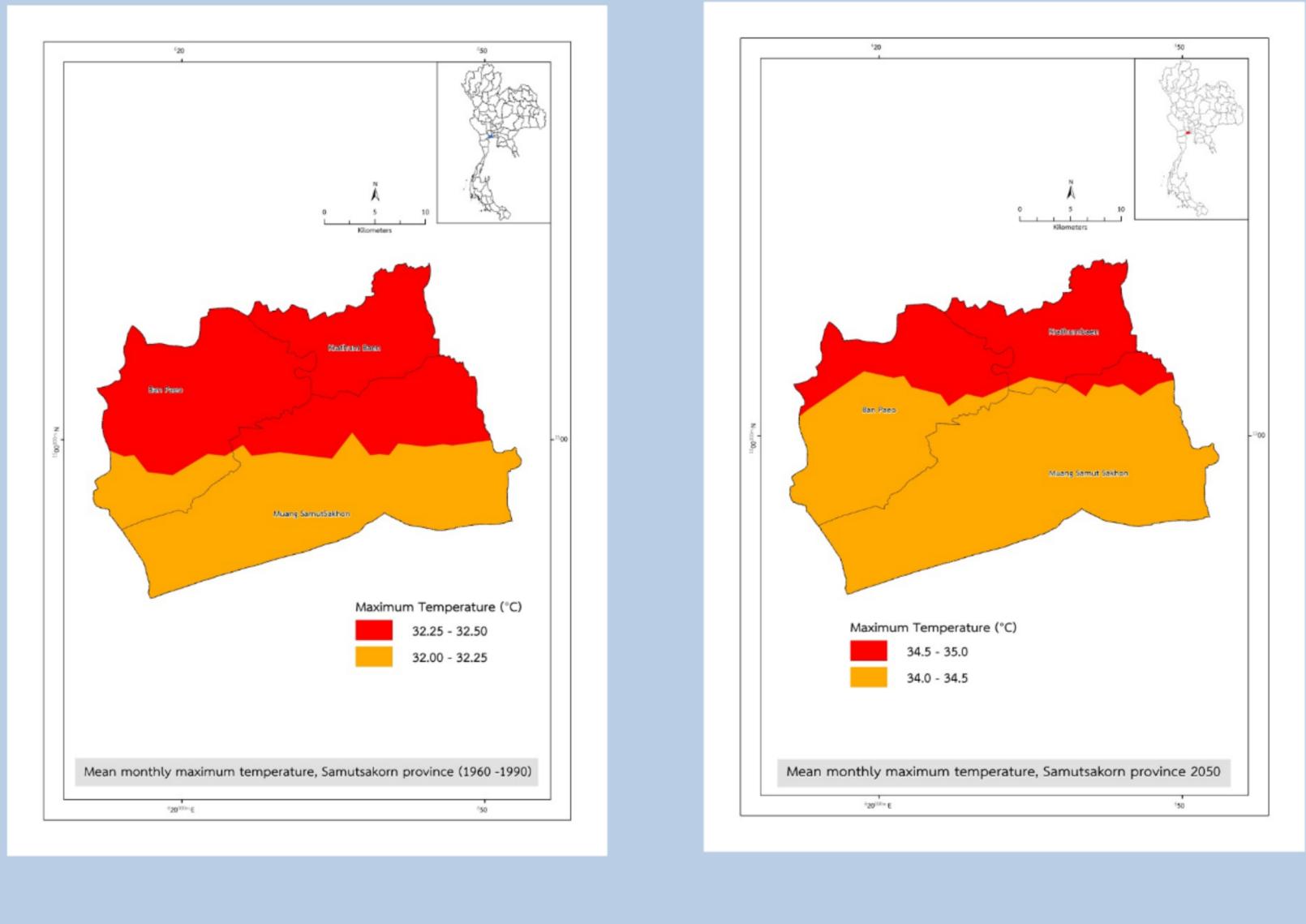
The old version is **Version 1.4**.

For this version you can get data for past, current and future climates.

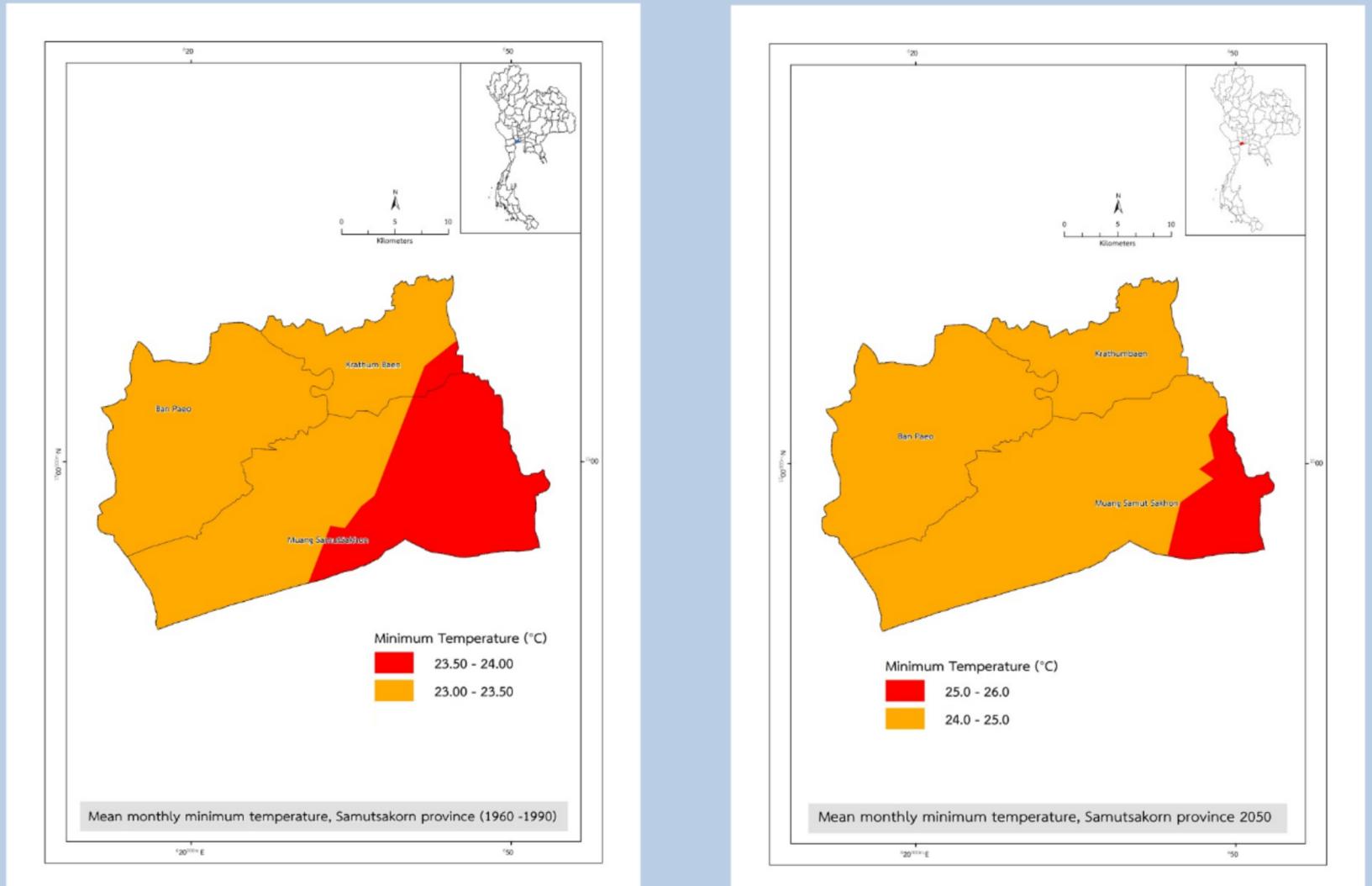
Monthly average temperature



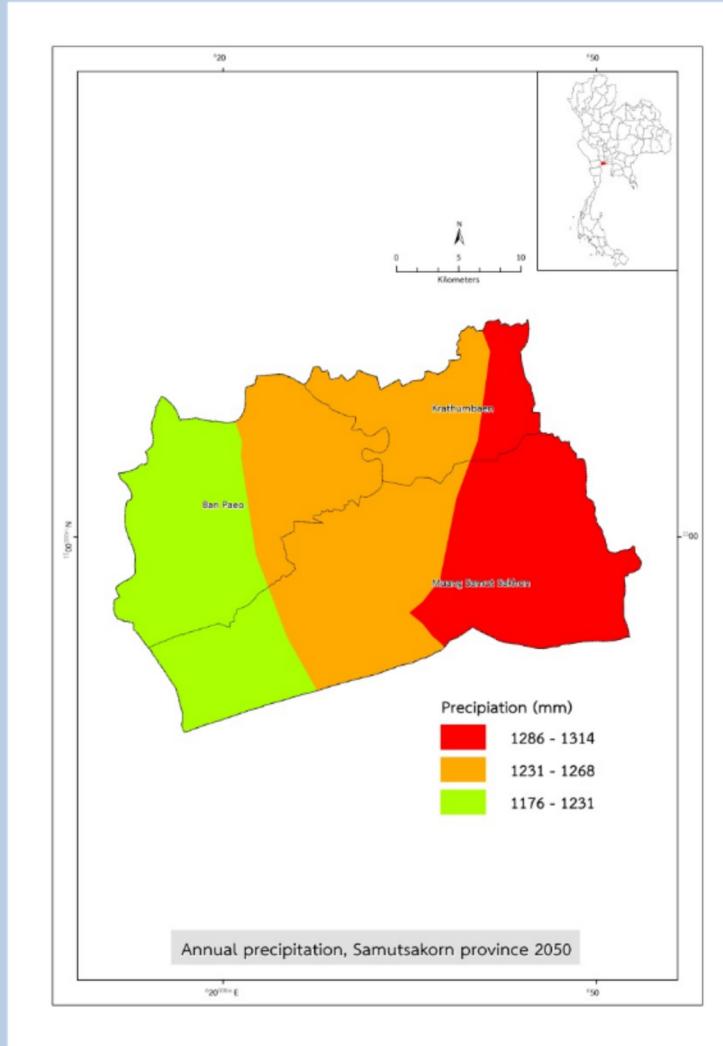
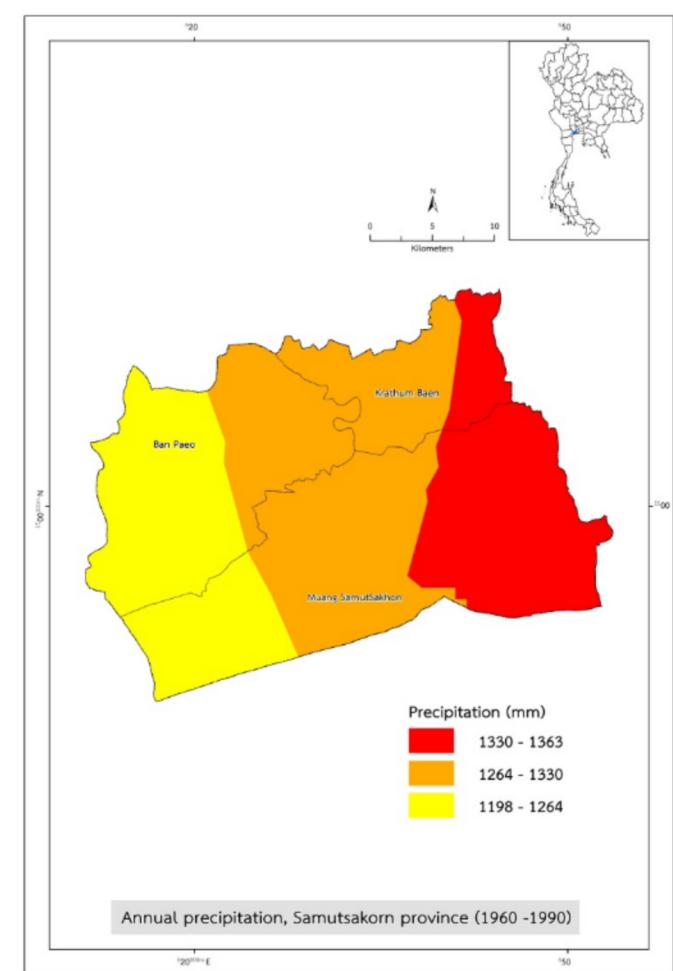
Monthly maximum temperature



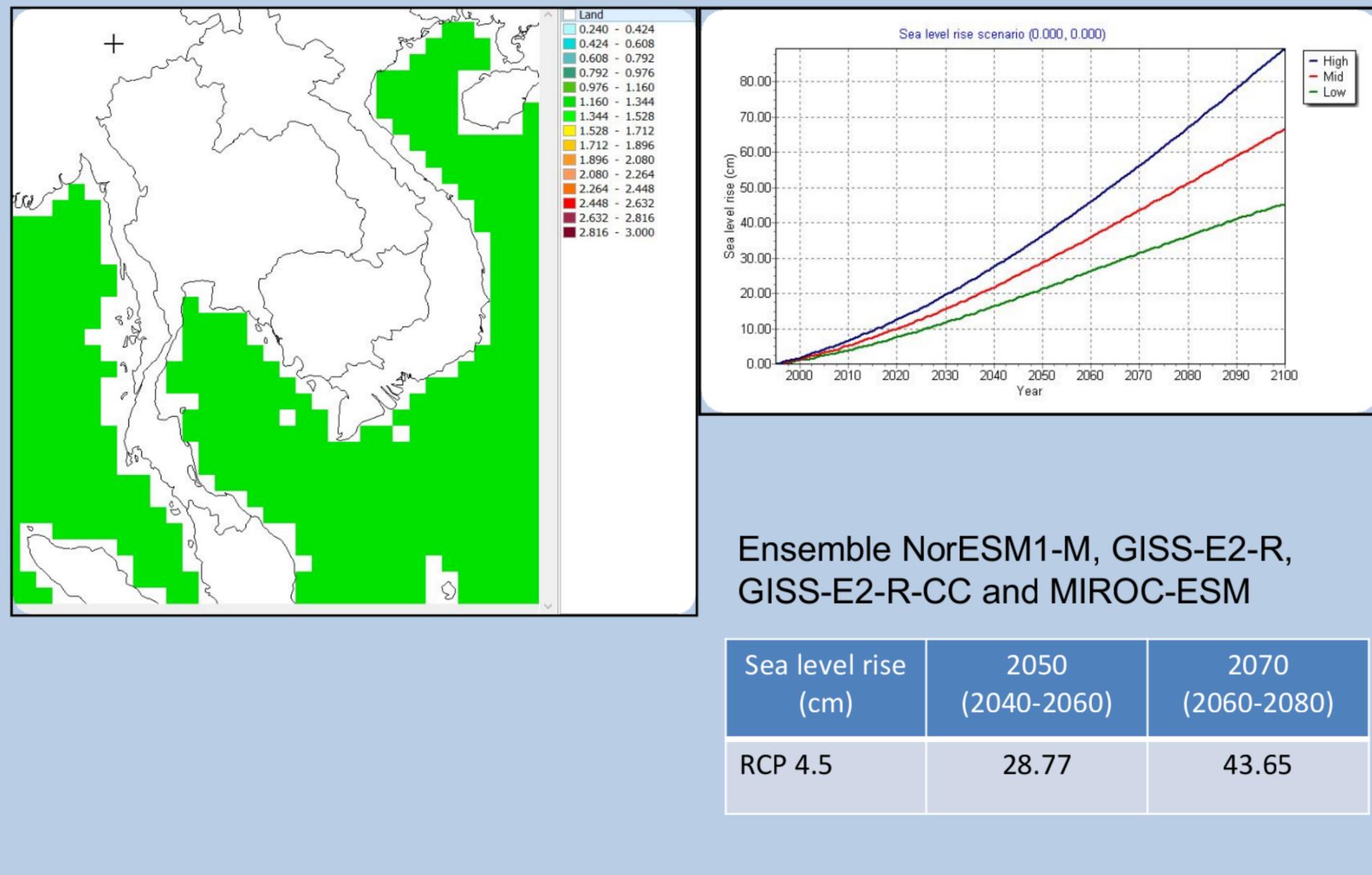
Monthly minimum temperature



Annual precipitation

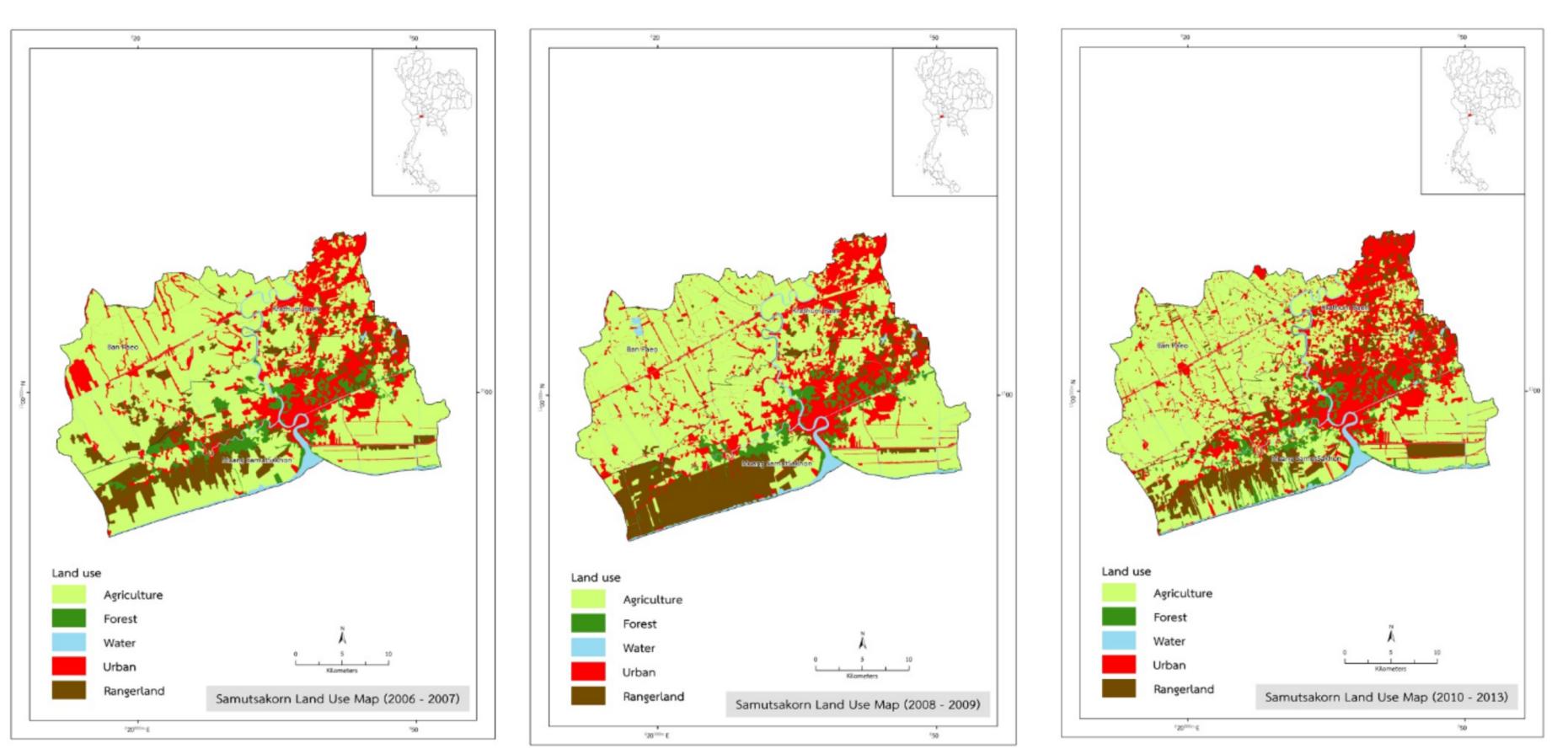


Sea level rise (4.5)



Climate parameter	1960-2000	2050
Average temperature	27.5 °C	30.5 °C
Precipitation	1198-1363 mm	1176-1314 mm
Min. Temp	23 °C	24 °C
Max. Temp	32 °C	34 °C

Land use change



Land use	Area (km²)		
	2008	2010	2013
Agriculture	531.400	518.961	494.253
Forest	45.810	34.945	36.661
Urban	164.762	165.451	199.727
Water	26.470	32.582	100.150
Miscellaneous	98.010	114.505	35.660

Source: Land development department (2016)

Land use study & survey

Data collection

Plan & Policy

Driving forces

Storyline

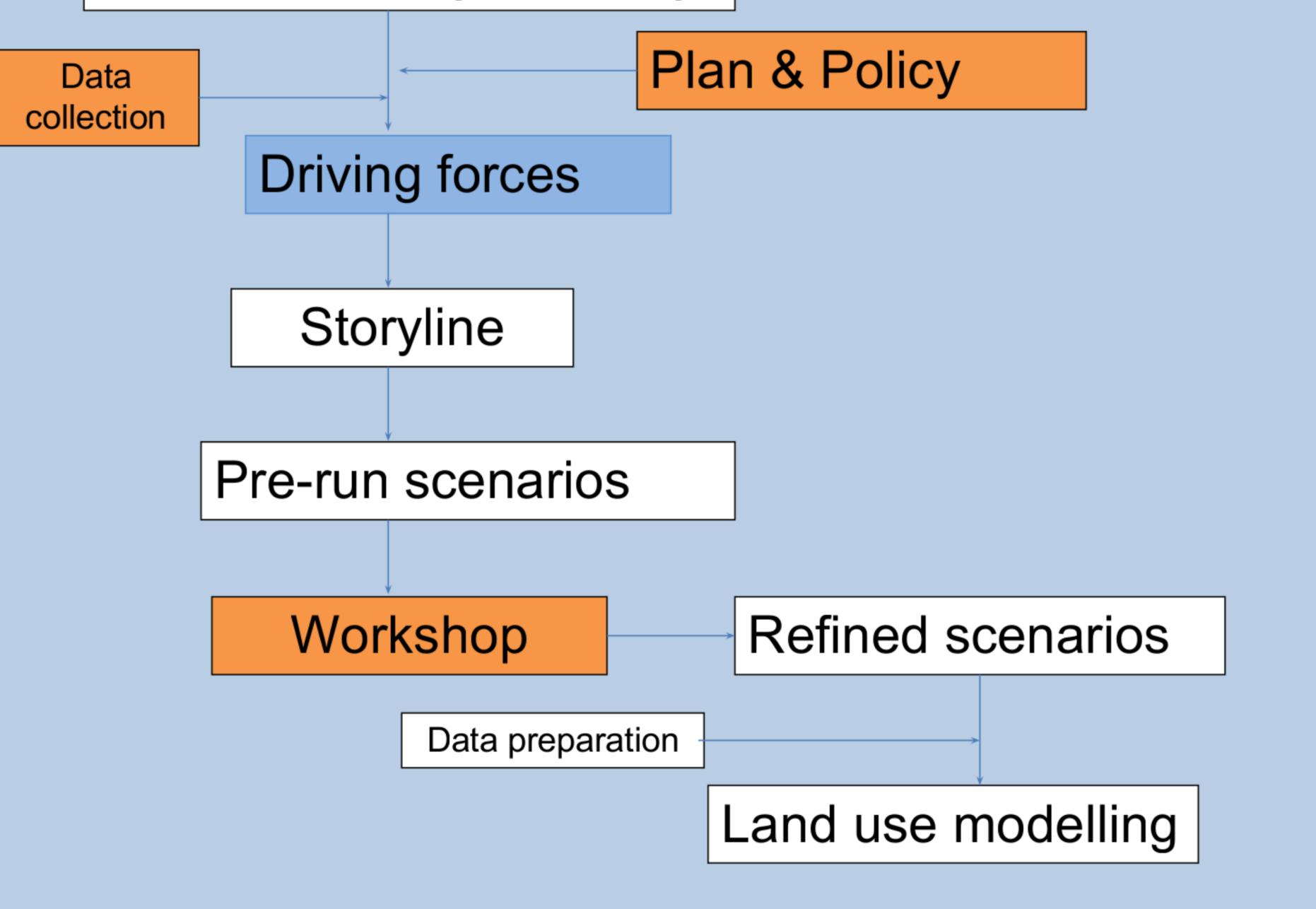
Pre-run scenarios

Workshop

Refined scenarios

Data preparation

Land use modelling



Stakeholder engagement

- To retrieve key information for identifying LU driving forces
- To derive consensus on scenario development



Socioeconomic change

Migrant workers

Business
as usual

Urban sprawl

Mangrove
Reforest*

Urban sprawl

Sustainability
driven

Mangrove
reforest*

Green aquaculture

Migrant workers*

Rapid
Tourism
development

Coastal
tourism
policy

Urban sprawl*

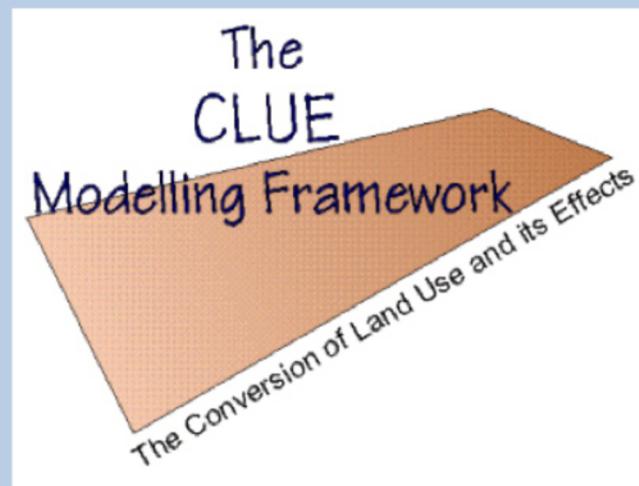
Socioeconomic change

Scenarios	BAU	RTD	SD
Agriculture	↓	↔	↑
Forest	↑	↓	↑↑
Urban	↑	↑↑	↑
Water	-	-	-
Miscellaneous	↓	↓	↓

Logistic regression

Resistance

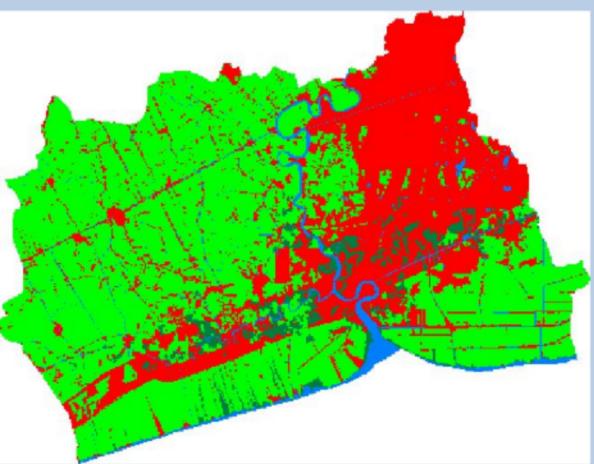
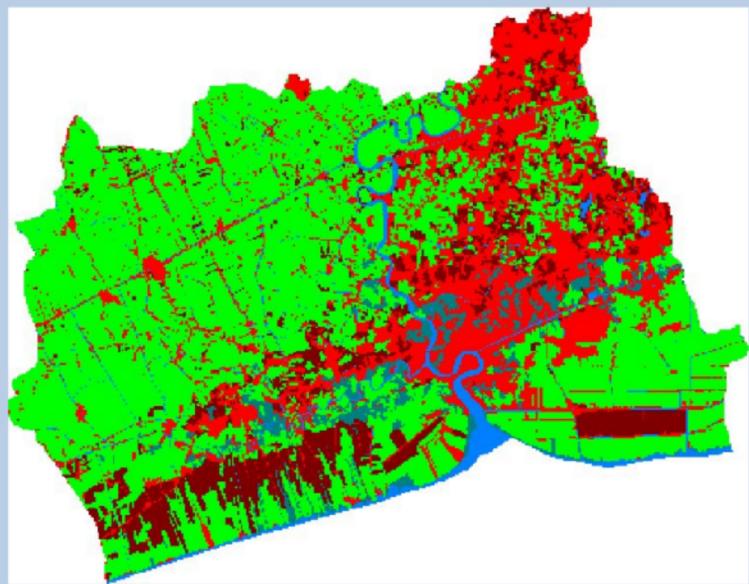
Land use services



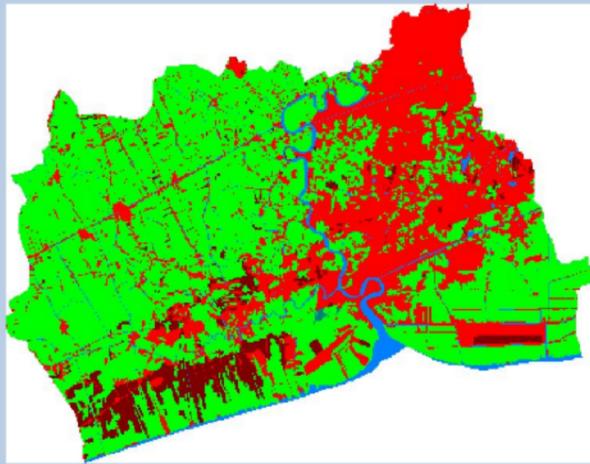
Land use
demand

Conversion
matrix

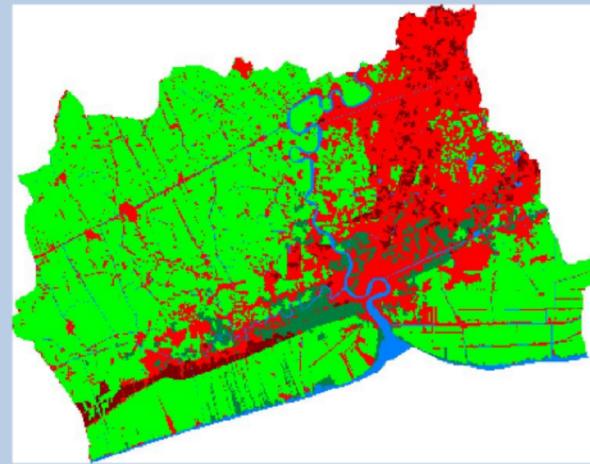
Conversion
order



BAU



RTD



SD

Impact of climate change and land use change on coastal ecosystem

- Sea level rise and coastal erosion
- Human disturbance, change mangrove area to shrimp farming and urban.
- Coastal land development project for tourism
- SD seems to be excellent for mangrove, but hard to achieve
- Stakeholder engagement is a key to identify input for land use scenarios.
- Instability of political is a huge barrier for climate-land use planning for coastal resilience in Thailand

Conclusion

- Climate and land use change projection, including sea level rise reveals a significant threat to coastal area, especially to mangrove
- Land use scenarios would be the key to understand socioeconomic change and do need to get involved by all stakeholder and for adaptation practices.
- A comprehensive framework for the integration of future projection to coastal resilience and sustainability.





Impact of climate and land use change on ecosystem services: A case study of Samutsakorn province, Thailand

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Received 17 February 2017, Revised 16 August 2017, Accepted 29 August 2017, Available online 11 September
2017.

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<https://doi.org/10.1016/j.ecoinf.2017.08.007>

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Highlights

- This research integrates climate and land use change projection to assess ecosystem services of mangrove forest.
- A novel approach of land use projection by scenario based method.

Thank you
Q&A