



District Level Carrying Capacity-Based Spatial Planning Towards Low Carbon Development

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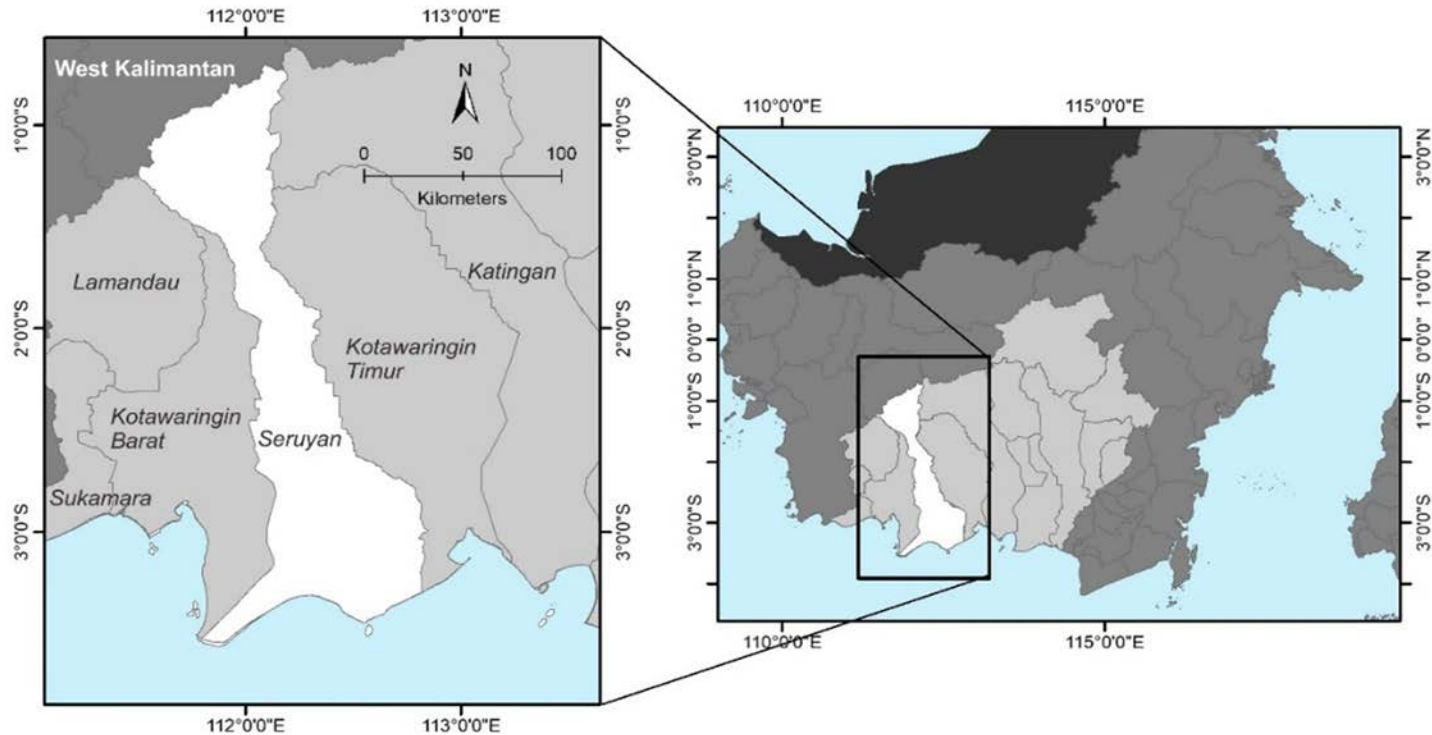
Carrying capacity assessment in Indonesia

- The concept of carrying capacity is mostly related to environmental issues
- A basis by the regional government to create RPPLH and KLHS (Law No. 32 2009 on Environmental Protection and Management)
- Based on expert's scoring and weighting on ecoregion and land cover types
- Carrying capacity classification:
 - 1. Very low (1-1.8);2. Low (1.81-2.6);3. Moderate (2.61-3.4);4. High (3.41-4.2);5. Very high (4.21-5)
- Carrying capacity status of water and food:
 - Exceeded or Not exceeded

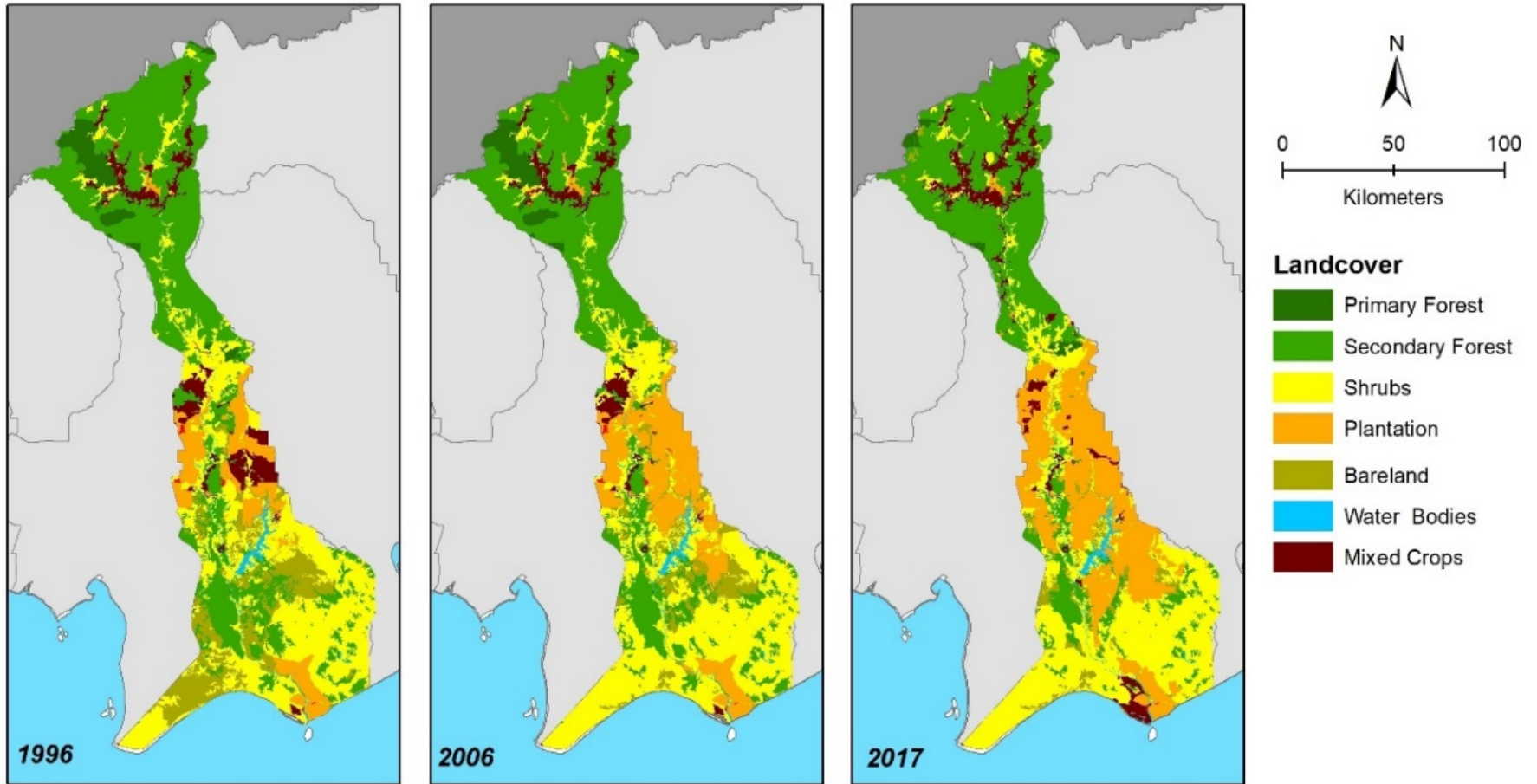


Study Area

Seruyan, Central Kalimantan



Land cover



2017-2030 Emission Comparison

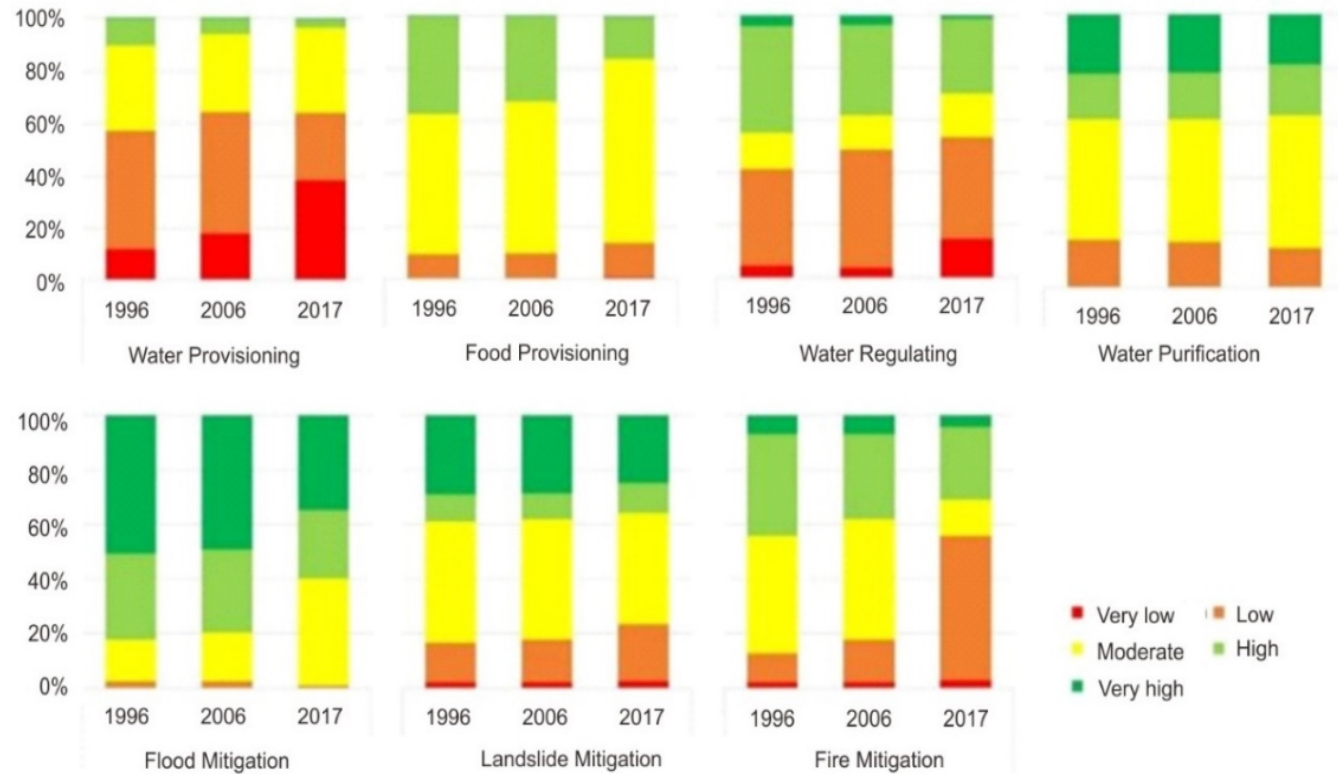
- District baseline: average annual emission from 1990-2012
- BAU scenario: Markov chain model to project land cover change from 2017-2030
- Carrying capacity scenario: Land cover change projection with carrying capacity-based recommendations

Emission factor:

Forest type	Emission Factor (tCO ₂ /ha)	
	Deforestation	Forest Degradation
Primary Dryland Forest	464.7	114
Secondary Dryland Forest	350.7	-
Primary Mangrove Forest	455.2	107.3
Primary Swamp Forest	474	179.9
Secondary Mangrove Forest	348	-
Secondary Swamp Forest	294.1	-



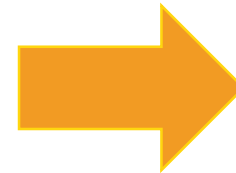
Results (1): Carrying Capacity



Results (2):

Policy recommendations based on carrying capacity and SDGs indicators

Ecosystem Services	Recommendation	SDGs indicators	Indicator
	Protect 477,342 ha of forest cover in the north	15.1.1.(a)	Increasing forest cover
Water Provisioning	Build water infrastructure to meet the water demand	6.1.1.(b)	Water infrastructure capacity to serve households, cities and industries, as well as water supply for islands.
	Increase water use efficiency for irrigation and industry	6.4.1.(b)	Agricultural/plantation and industrial water efficiency incentives.
	Increase the cultivation area based on further research	2.3.1	Increasing food crop productivity
Food Provisioning	Increasing food crop productivity	2.3.1	Increasing food crop productivity
	Meet the foodstuff demand	2.1.2.(a)	Decreasing population with a minimum calorie below 1400 kcal/capita/day.
Water Regulation	Protect 477,342 ha of forest cover in the north	15.1.1.(a)	Increasing forest cover
	Preserve and restore 15,306 ha of riparian area in the river	6.3.2.(b)	Improving the quality of river water as raw water
Water Purification	Preserve and restore 3,708 ha of riparian area in the lake	6.3.2.(a)	Improving the quality of lake water
	Reducing water pollution	6.2.1.(e)	The number of districts / cities that have built wastewater infrastructure
	Restore 281,998 ha of shrubs and bare land within the forest zone	15.3.1.(a)	Degraded land rehabilitation
Flood Mitigation	Protect 477,342 ha of forest cover in the north	15.1.1.(a)	Increasing forest cover
	Preserve and restore 15,306 ha of riparian area in the river	6.3.2.(b)	Increasing forest cover
Landslide Mitigation	19,293 ha of area with > 45% slope	15.3.1.(a)	Degraded land rehabilitation
	Restore 103,174 ha of shrubs and bare land within the national park	15.1.1.(a)	Increasing forest cover
Fire Mitigation	Restore 281,998 ha of shrubs and bare land within the forest zone	15.3.1.(a)	Degraded land rehabilitation

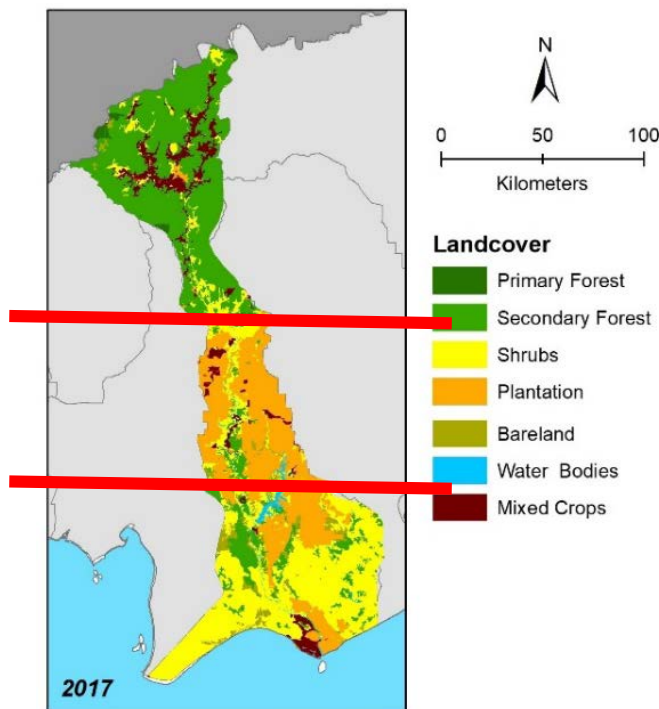


- To protect all the existing forest cover in the north
- To restore area within the forest area and national park
- To preserve and restore the riparian area and area with > 45% slope



Recommendations

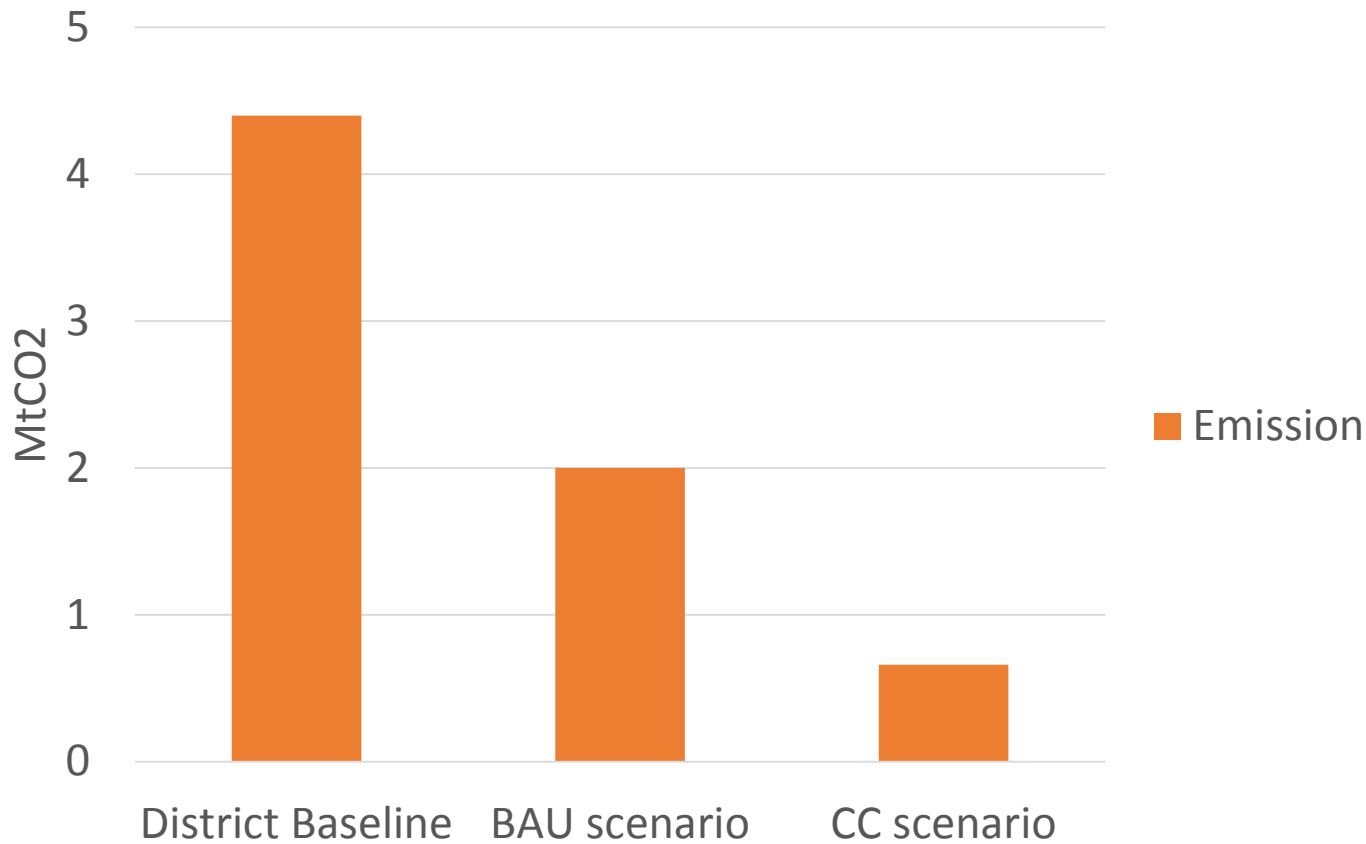
- The protected areas in the CC scenario cover 0.48 M ha of forest cover or 86% of the total forest cover in Seruyan District.



- North: mostly covered by forest cover which has a high score for all the ecosystem services assess in this study and should be maintained
- Middle: mostly covered by palm oil plantation. The recommendations for this region are to restore the riparian area that covered by forests and shrubs, respectively.
- South: mostly covered by shrubs and bare land. In order to improve the ecosystem services, restoration is needed

Results (3):

Annual Emission from Deforestation and Forest Degradation 2017-2030



Limitations and uncertainties

- This method relies heavily on the qualitative expert estimation of ecosystem services score and weight for each land cover and ecoregion types.
- Tailored for national or island scale
- Markov-based land cover projection neglects policy change, population growth and land suitability
- Carrying capacity scenario assumes all the recommendations is done (protect 86% of the existing forest cover)



Conclusion

- Carrying capacity can be used to integrate forest preservation into the spatial plan by a formal law
- Forest preservation will have a significant impact on emission reduction, while at the same time improve the ecosystem services for the benefit of the community.
- Carrying capacity is a tool for low carbon development at district level





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Thank You!

