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SMART SURVEYORS FOR LAND AND WATER MANAGEMENT CHALLENGES IN A NEW REALITY



e WORKING WEEK 2021
20-25 JUNE

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Paper ID-10871

**Forest cover change analysis on a protected area
in Southern Myanmar using remote sensing and GIS technique:
Applications to forest conservation**
23th June, Section 8.2, 20:00-21:30 PM

ORGANISED BY

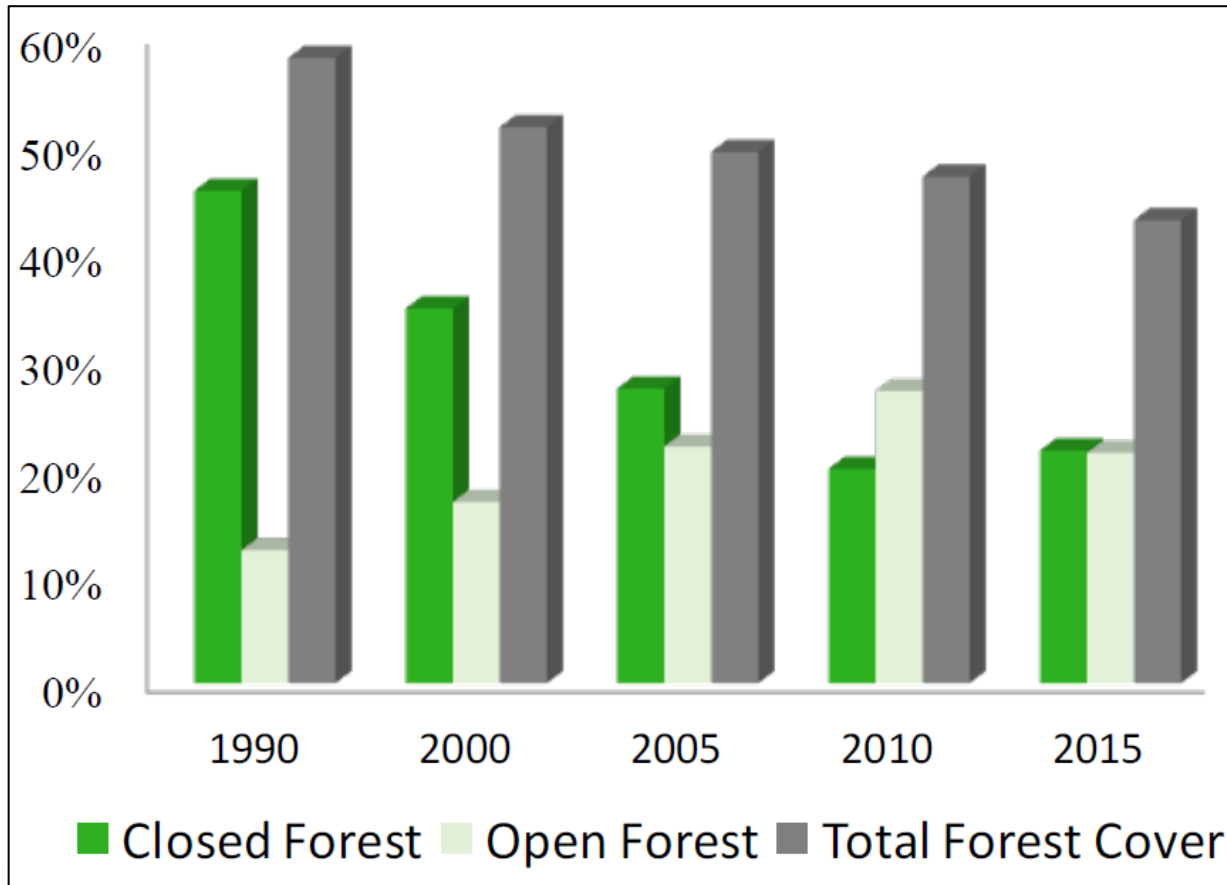


PLATINUM SPONSORS





Deforestation and forest degradation in Myanmar



-Closed Forest: 49%
to over 20%

-Total Forest:
59% to over 42%

Myanmar

➤ one of highest deforestation rate in Southeast Asia (FRA, 2015)



Why is it interested in Southern Myanmar?



Agriculture



Development projects



Legal/ illegal logging



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Perennial plantations

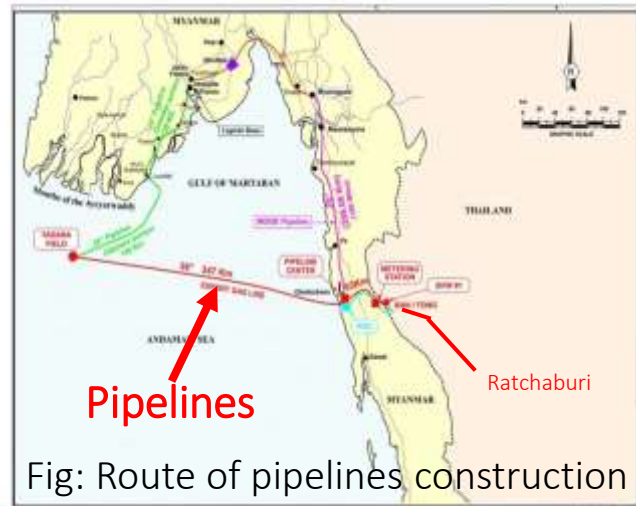
Taninthayii Nature Reserve (TNR)

- biodiversity hotspot defined as protected area



TNR-Project (TNRP) information

- **TNR Project:** 2005-2028 managed by Forest Department, demarcated as a **protected area**
- Financial support: three international oil and gas companies for passing through the Reserved Forests (RF)
- Total compensation payment: \$ 4.2 million (2005-2016)



Ethnic issues

Myanmar

- multiracial country (over 135 tribes)

Taninthayii Nature Reserve (TNR)

- Four ethnic groups
 - ❖ Dawei, Kayin- forerunner tribes
 - ❖ Mon & Burma- migrants
- Base of two ethnic army forces;
Mon and Kayin ethnicity
- Conflicts- between the natural resource utilization activities and conservation work

(unpublished data, TNR project national reports)



New Mon State Party

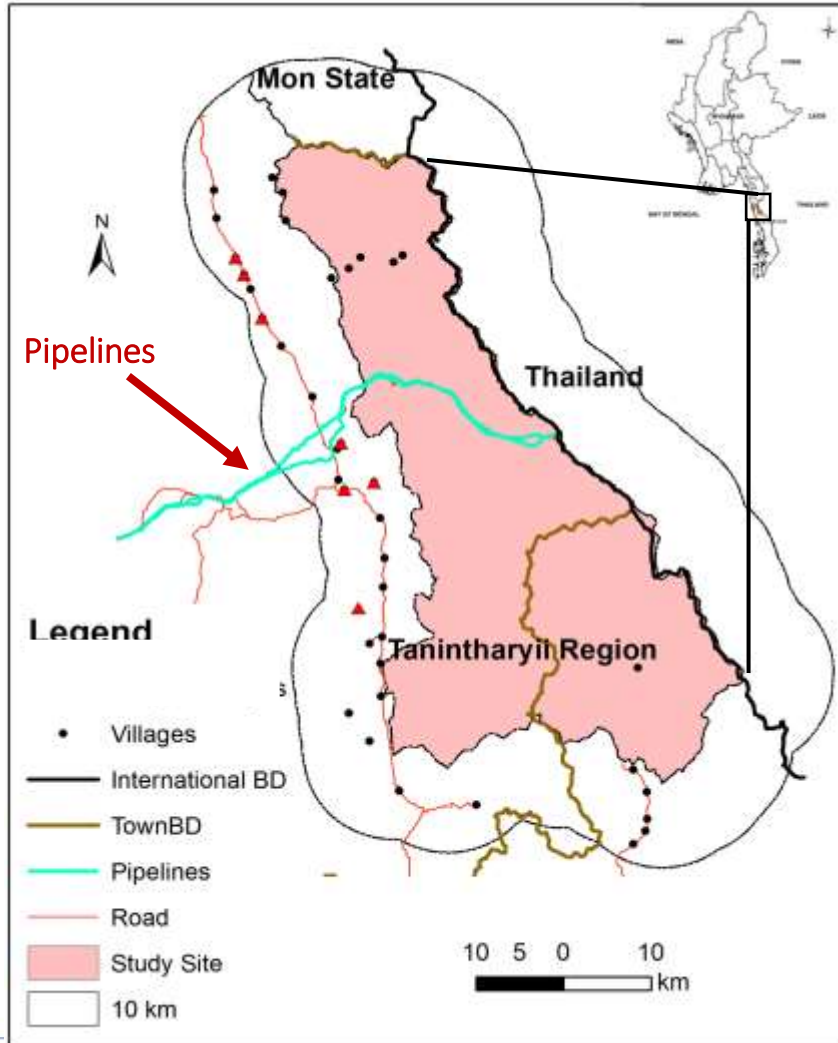
Kayin National Union (KNU)

Objectives

Contributing up-to-date information in sustainable forest management and land use planning

1. To clarify land use land cover change, focusing on deforestation processes (1990-2006-2017)
2. To examine the situations and effectiveness of PAS management in Myanmar

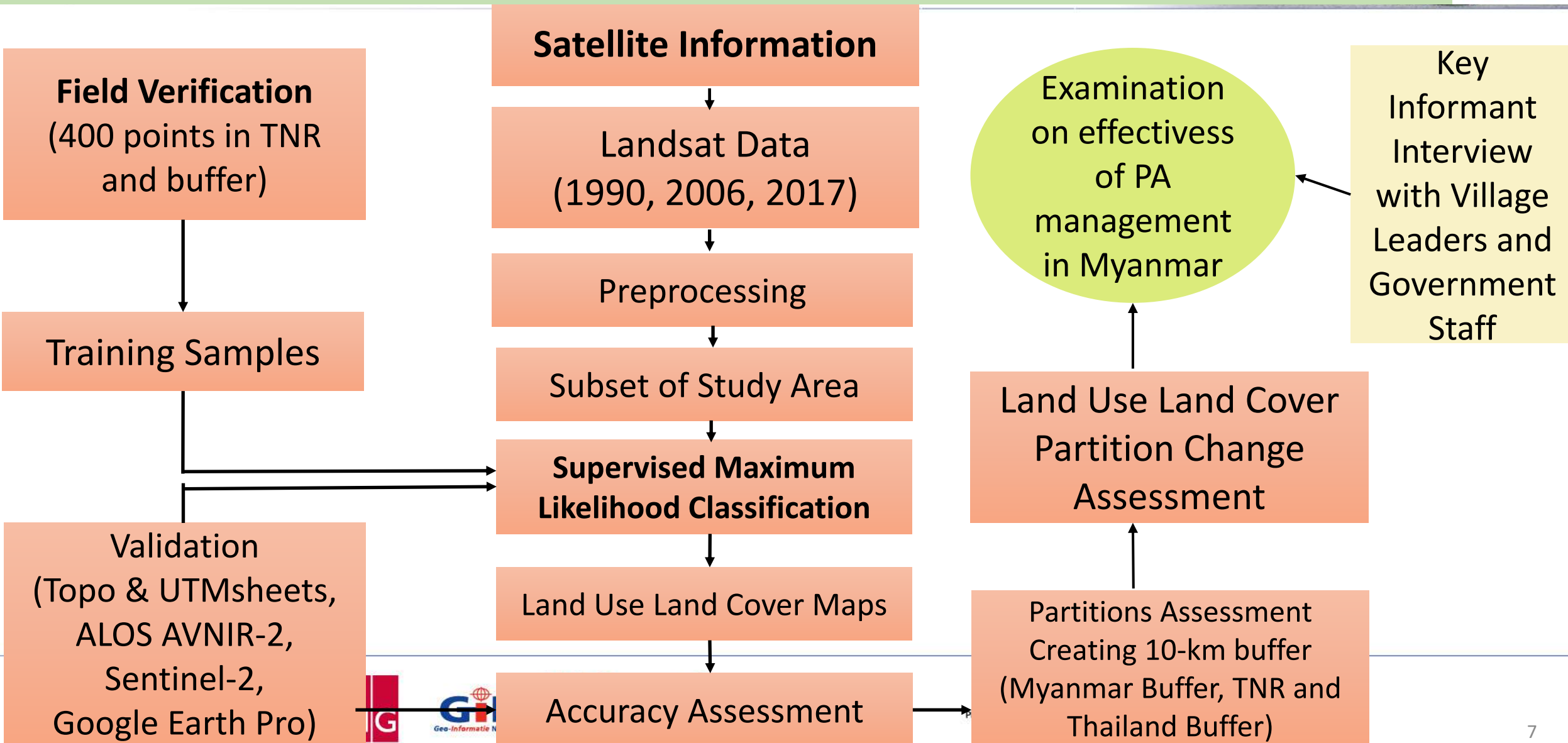
Study site



- Taninthayii Nature Reserve (TNR)
- Protected Area defined in 2005
- 30 villages outside TNR and 11 villages inside TNR
- 9 - 38 °C (Temperature)
- 3200 - 6600 mm (Precipitation)
- 15 – 1400 m (Elevation)
- Dominated by Tropical Rainforests

Fig: Location of study site, pipelines and survey villages

Flow chart of methodology



Land use/land cover (LULC) class

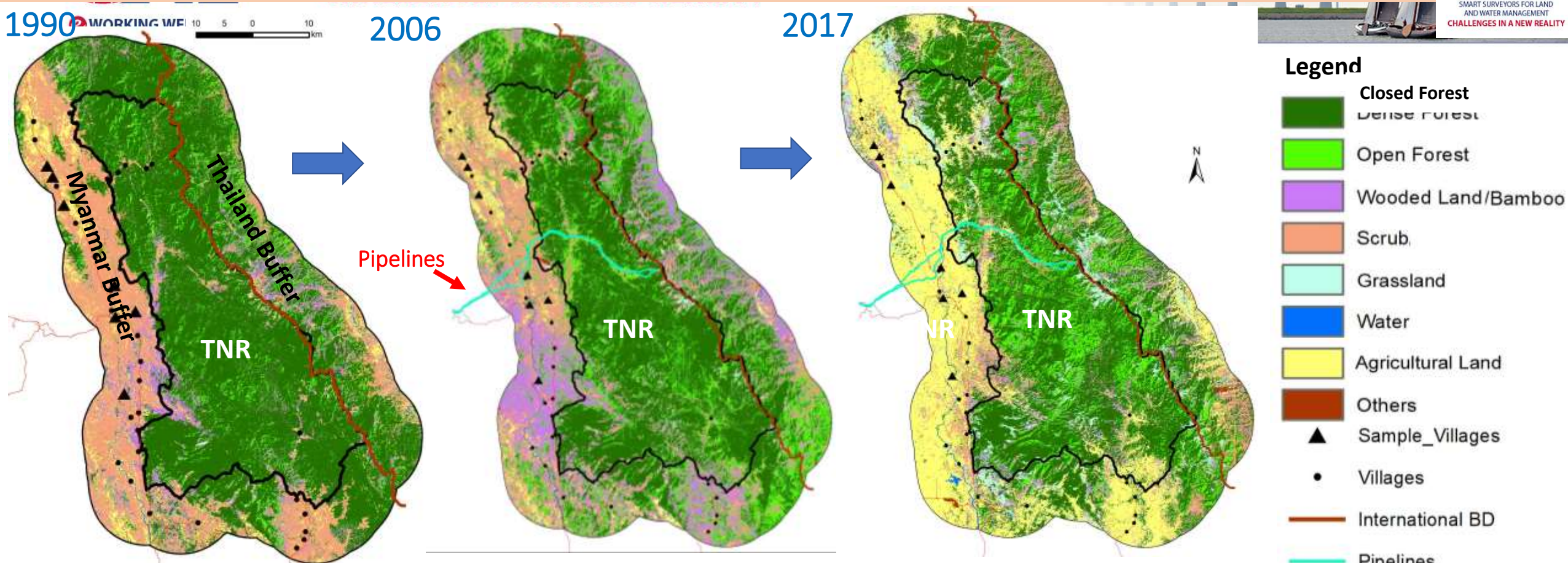
	LULC class	Description
1	Dense Forest	>40% (canopy cover)
2	Open Forest	10 - 40% (canopy cover)
3	Wooded Land	5 - 10% (canopy cover), bamboo
4	Scrub	lower shrubs, thatch
5	Grassland	green and dry grass, grazing land,
6	Agricultural Land	rice/corn field, orchard, rubber/ oil palm plantation
7	Others	settlement, bare land, rocky, transportation
8	Water	permanent open water, streams, rivers, reservoirs





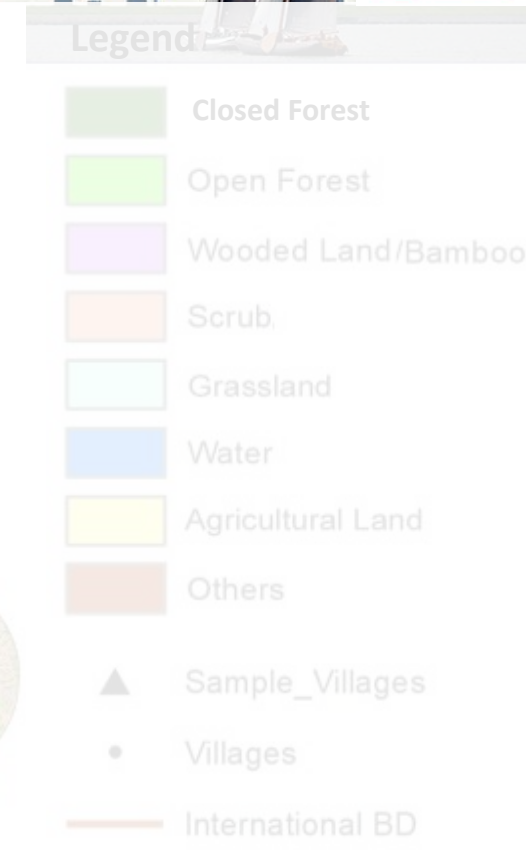
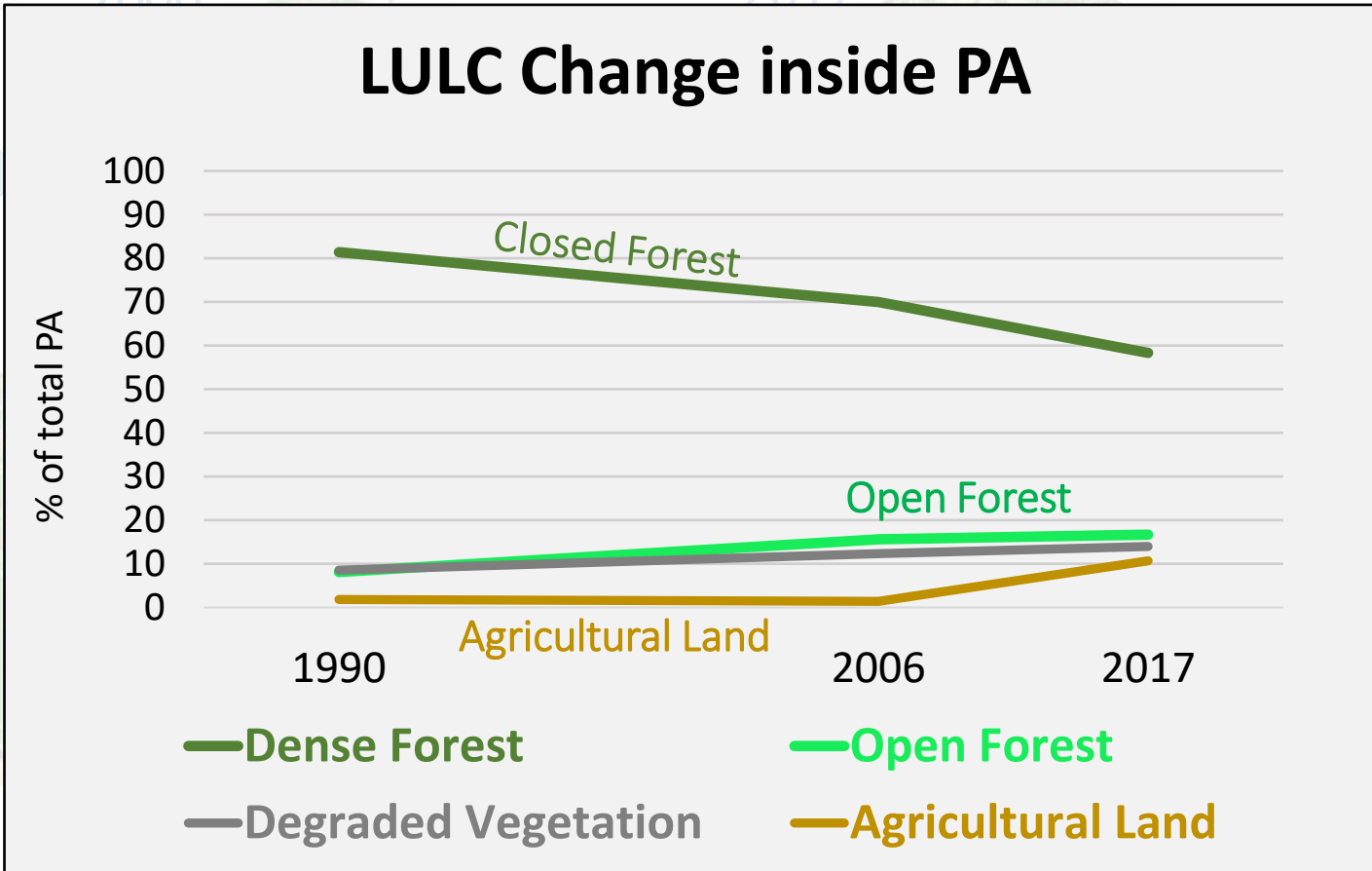
Results: Land Use/ Land Cover (LULC) Change

Maps of land use/land cover



LULC by Year	Kappa Accuracy
1990	74.75%
2006	80.16%
2017	84.32%

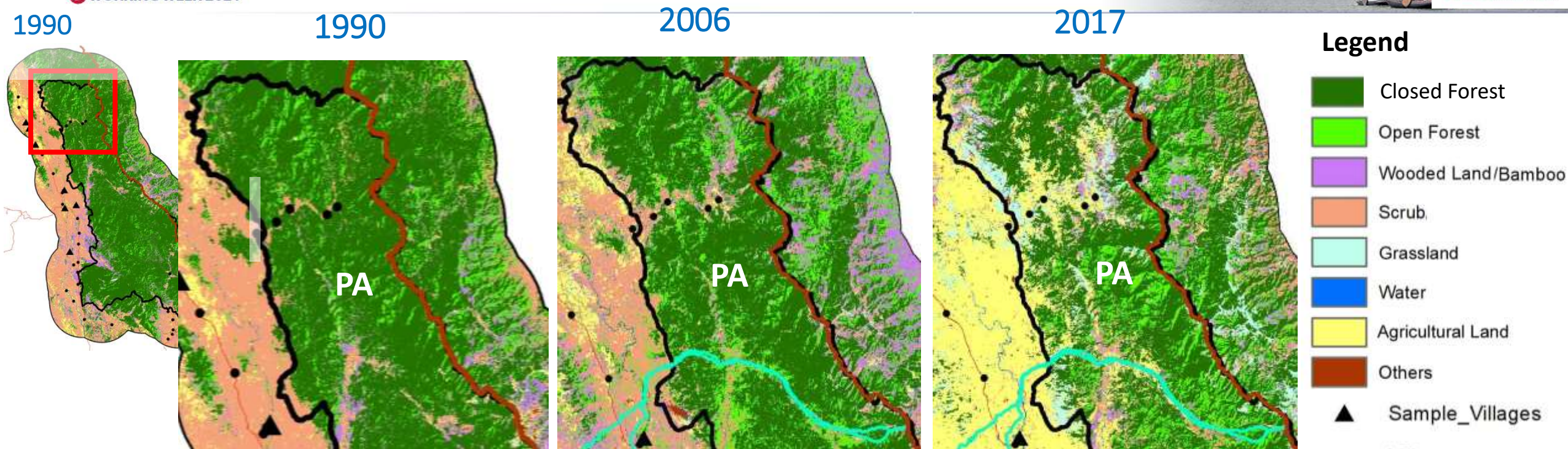
Maps of land use/land cover



- Closed forest decrease
- Agricultural land increase

Degraded vegetation means the combination of three categories: wooded land, scrub and grassland.

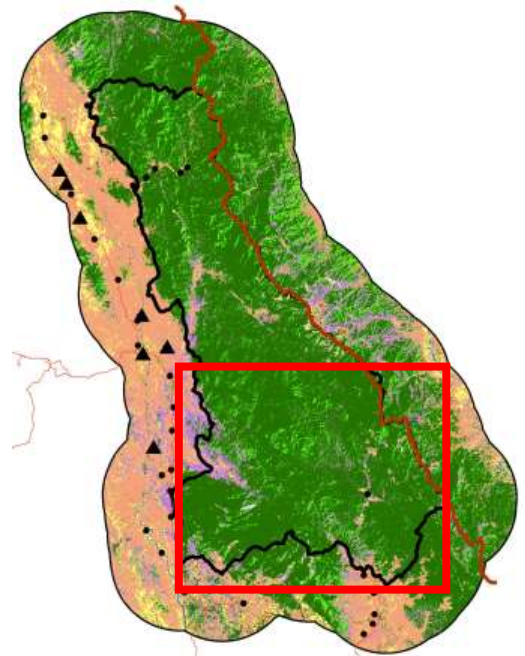
Land use/land cover change inside PA



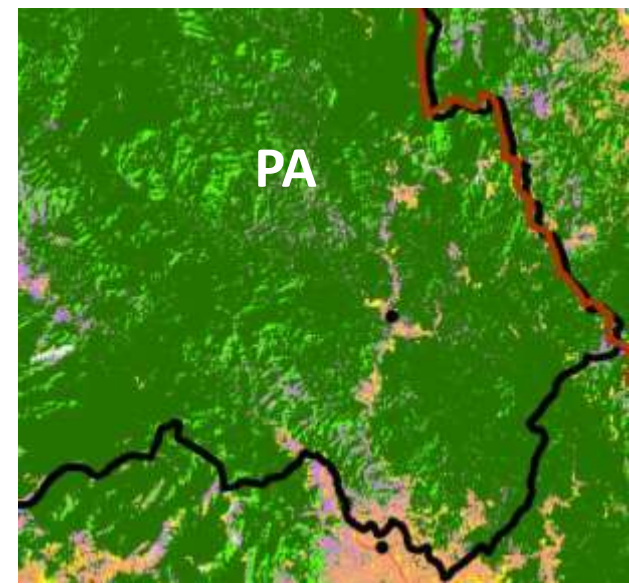
- Deforestation pattern surrounding the villages
- Less suffered the forest deterioration near the pipelines

Land use/land cover change inside PA

1990



1990



2006


















2017

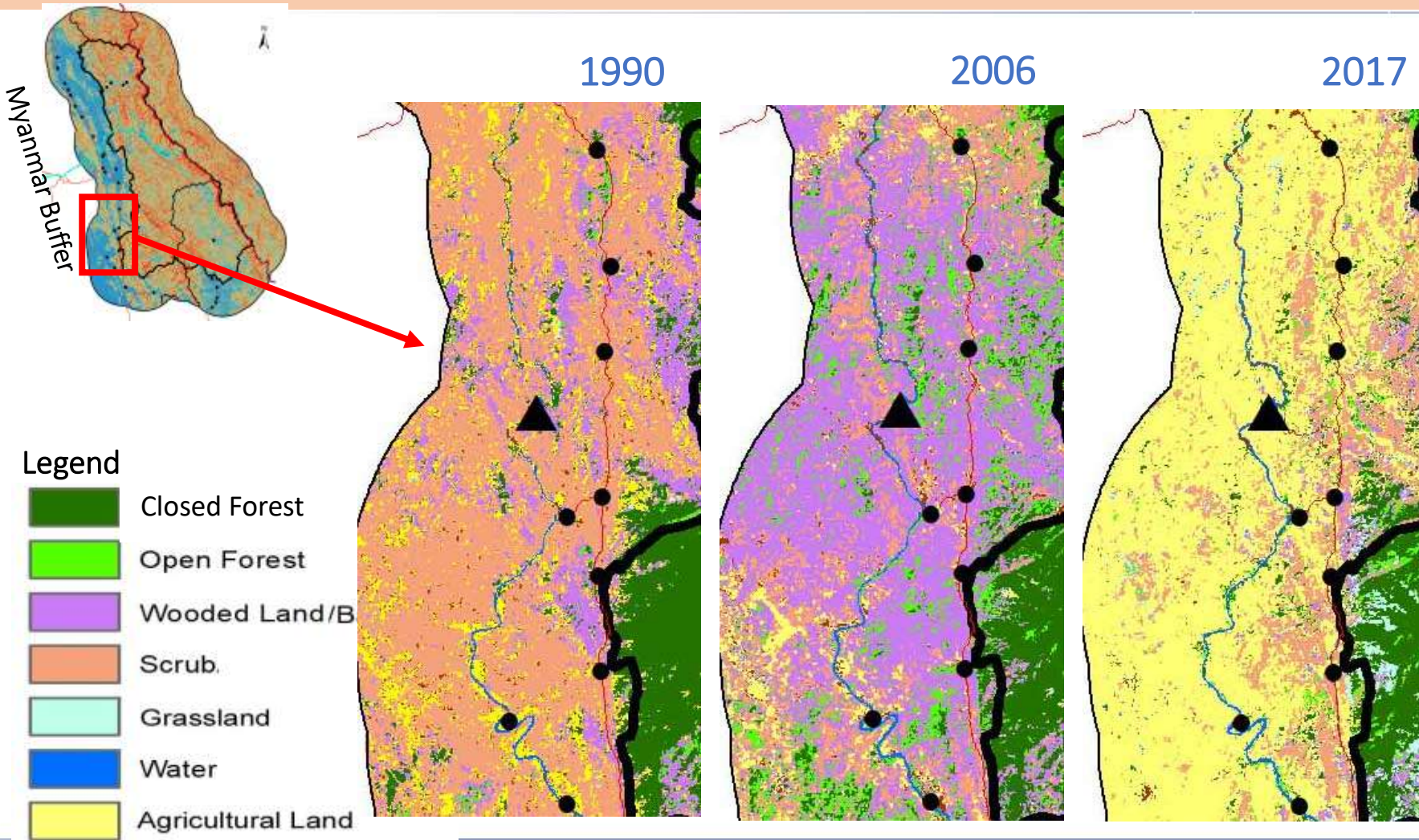


- Forest deterioration in the interior part of PA
- Agricultural expansion nearby the villages

Legend

- | | | | |
|---|--------------------|---|------------------|
|  | Closed Forest |  | Sample_Villages |
|  | Open Forest |  | Villages |
|  | Wooded Land/Bamboo |  | International BD |
|  | Scrub |  | Pipelines |
|  | Grassland |  | Road |
|  | Water |  | TNR |
|  | Agricultural Land |  | 10 km |
|  | Others | | |

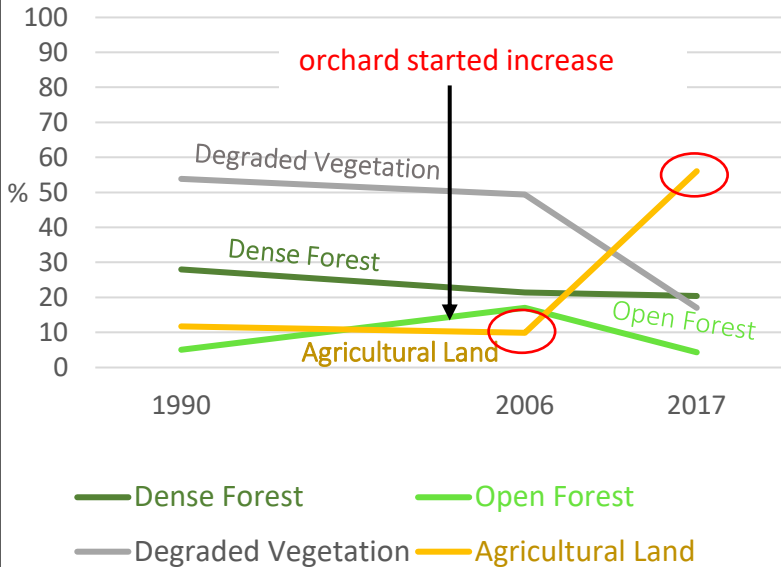
LULC change in Myanmar Buffer



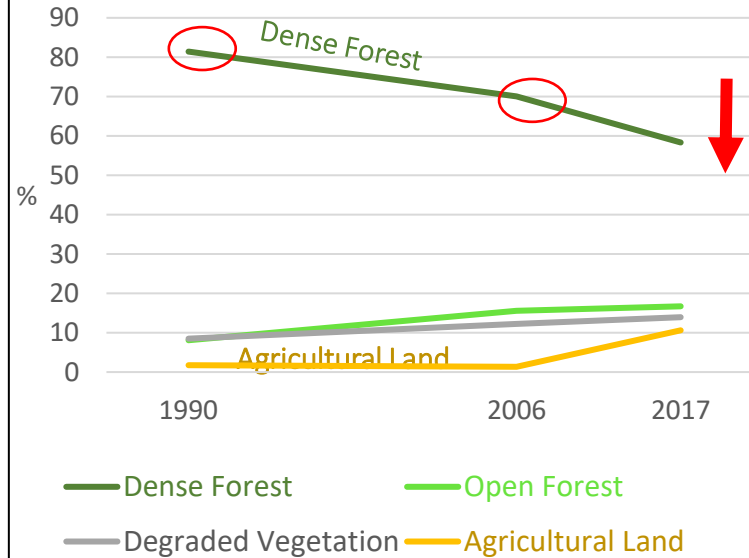
- In 1990, dominant scrub land as shifting cultivation
- In 2006, dominant wooded land as fallow forest
- Finally, open forest and degraded vegetation converted to the agricultural land/ orchard.

LULC change in Myanmar Buffer and PA

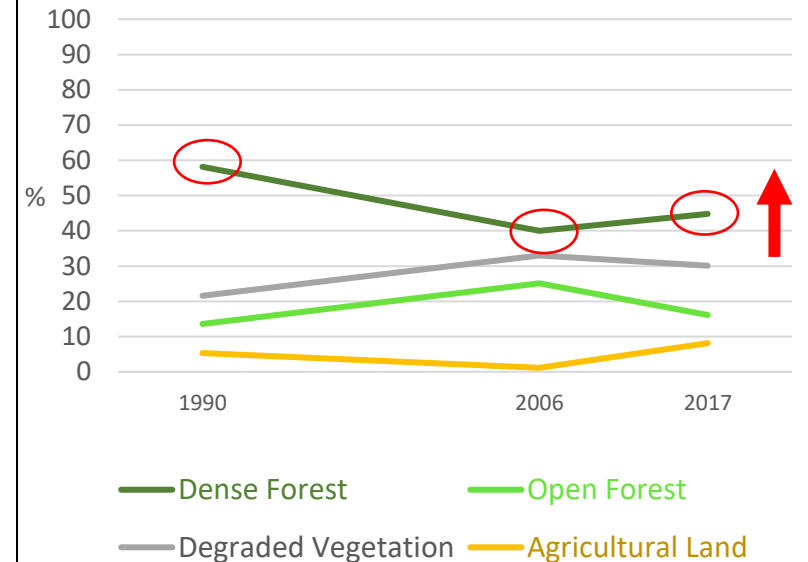
LULC Change in Myanmar Buffer



LULC Change in TNR



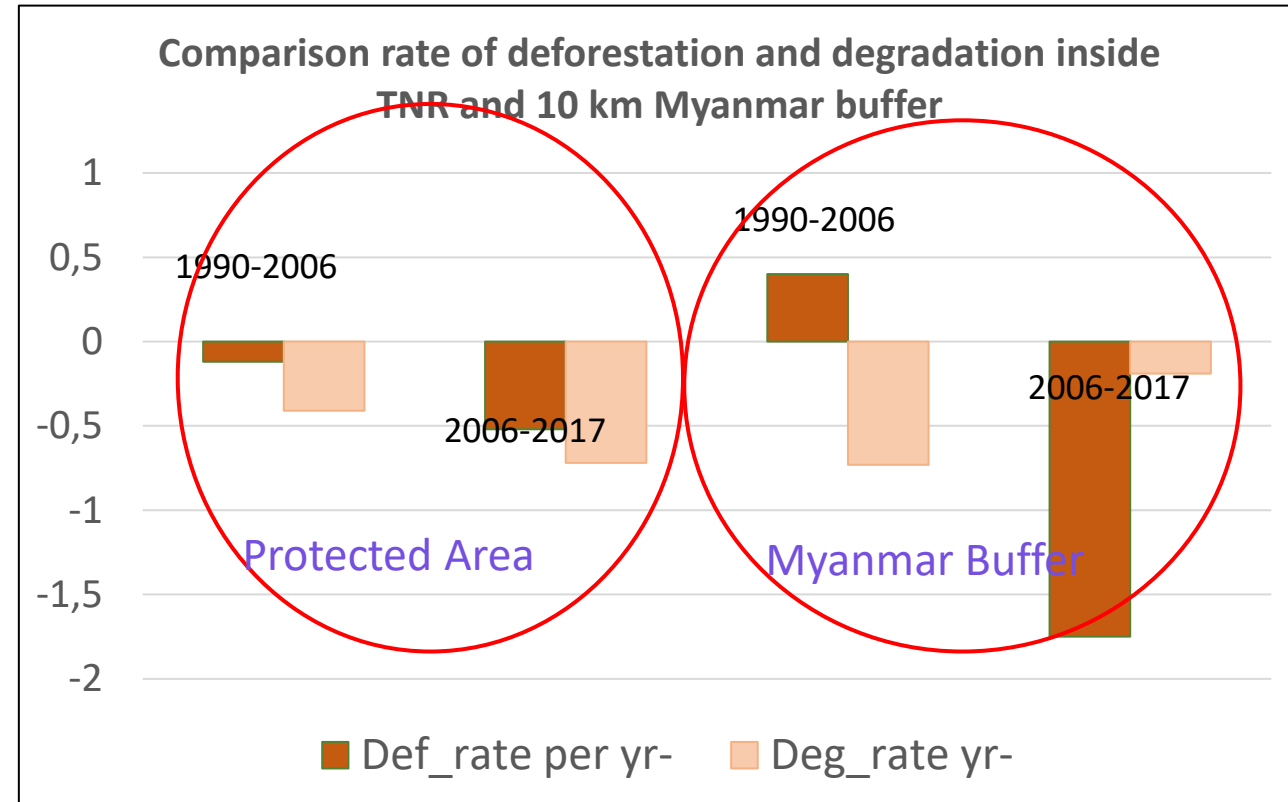
LULC Change in Thailand



- In Myanmar buffer zone, agricultural land is remarkably getting increased, after protection
- Inside PA, dense forest cover periodically decrease, they can monitor partially the conversion of forest to other land use

Rates of deforestation and forest degradation

Location	Study period	Def_rate per yr-	Deg_rate yr-
1. TNR, protected area	1990-2006	-0.12	-0.41
	2006-2017	-0.52	-0.72
2. Myanmar Buffer	1990-2006	0.40	-0.73
	2006-2017	-1.75	-0.19



- Similarly, deforestation rate and forest degradation rate after protected is steadily higher than any rate at the time of before protection.
- PAS cannot result the forest cover increment.



General Discussion

Causes of forest degradation inside PA

Dense forest gradually changed to open forest over time



- Before TNR project

19th C-2004: commercial logging by Myanmar Government

(unpublished data, TNR-project national reports)

1989-1996: commercial logging by Thai concessions

(unpublished data, TNR-project national reports)

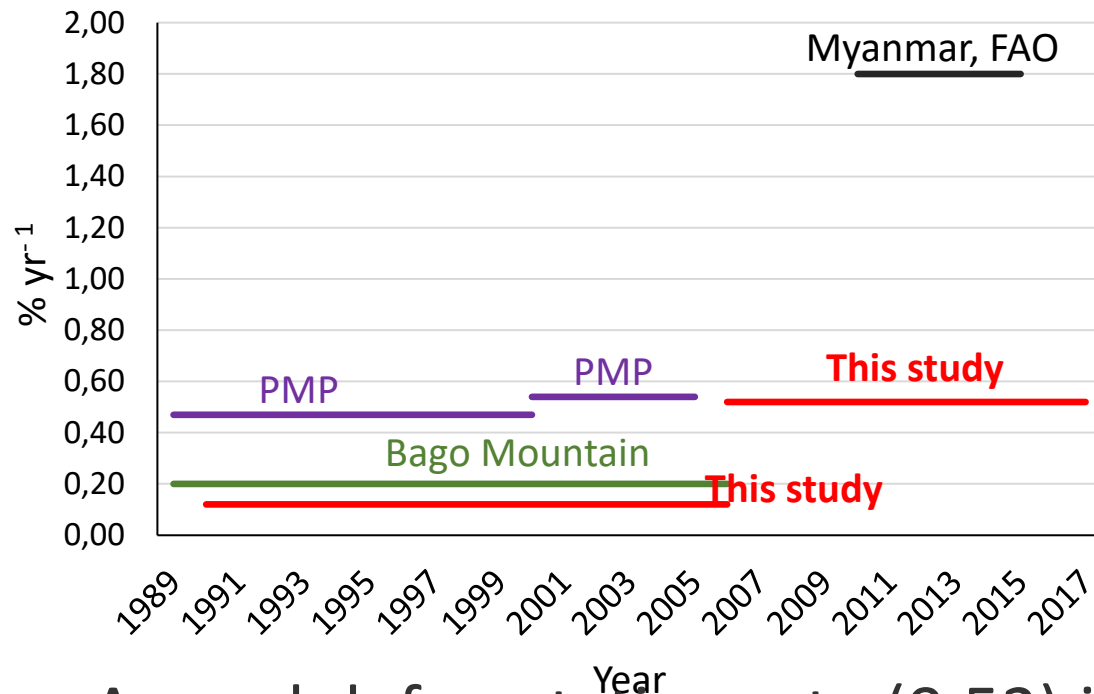
- After TNR project

illegal logging extractions by Kayin & Mon ethnic armed groups cooperating with outsiders

(Information getting from conducting socio-economic survey)

Evaluation of forest protection in PA

Comparison of deforestation rate



FAO-FRA (2015) for Myanmar

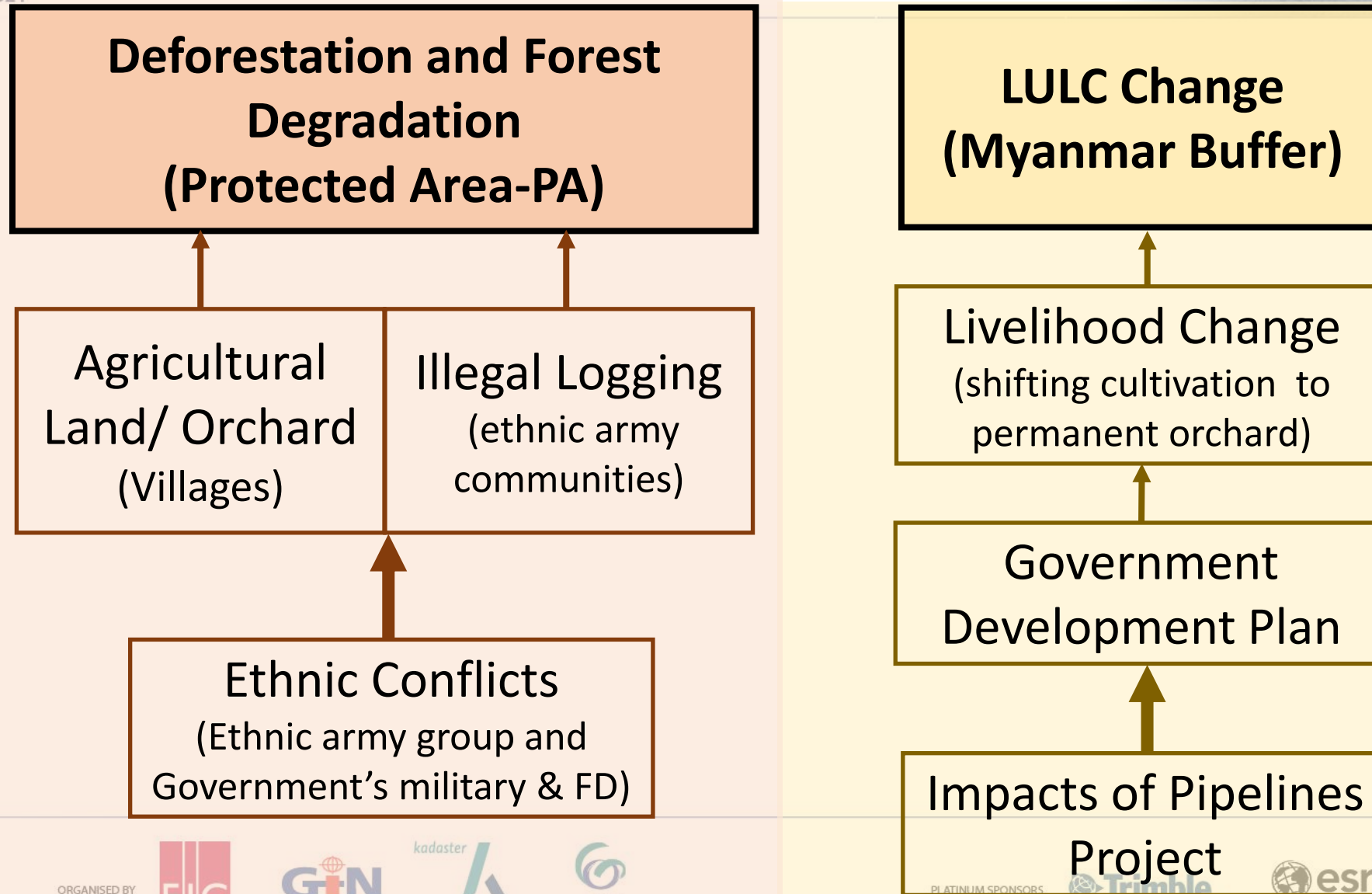
Protected Forest (PA) in Myanmar, Popa Mountain Park (PMP) (Htun et al., 2009)

Production Forest in Myanmar, Bago Mountain (Mon et al., 2010)

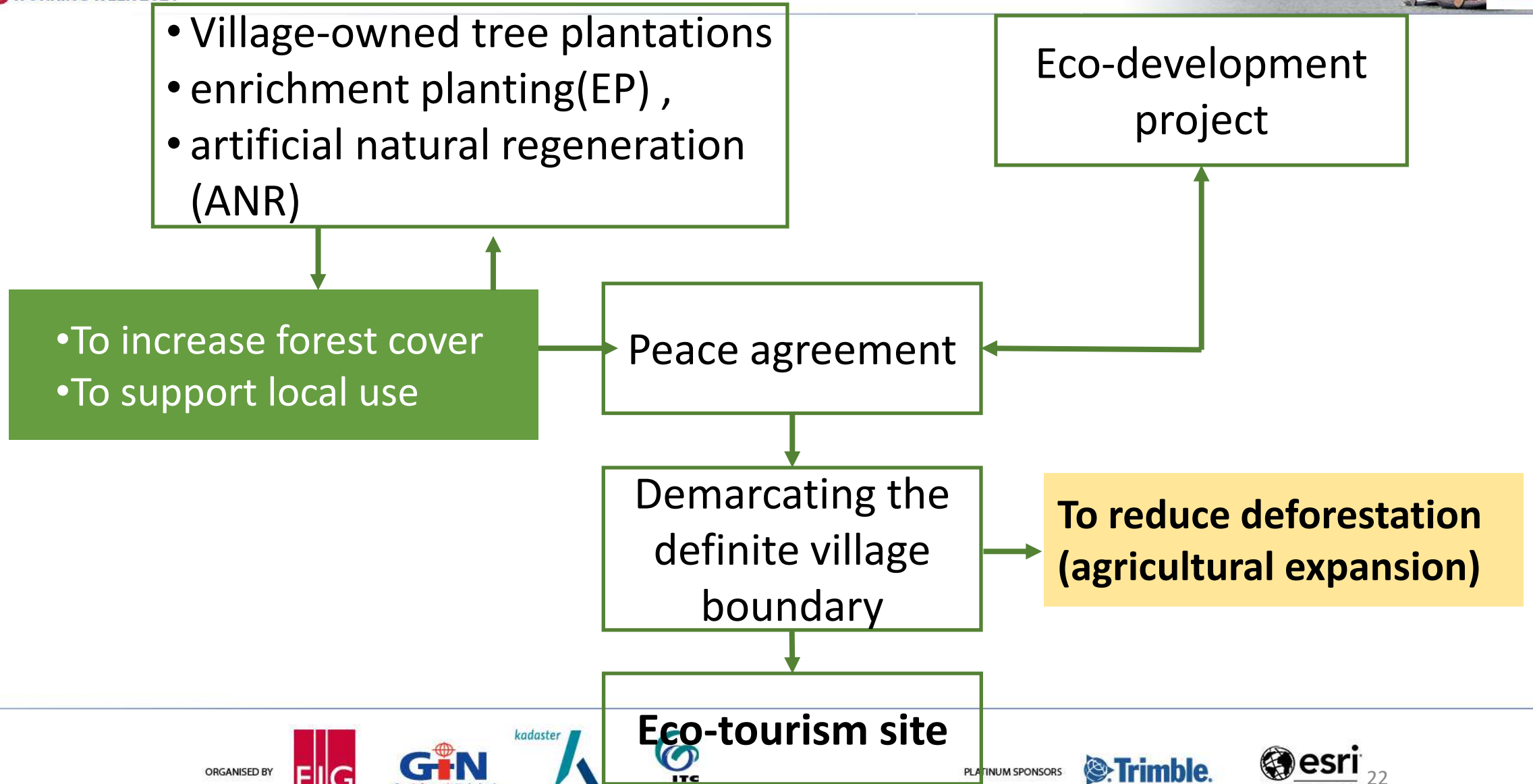
This study (1990-2006) & (2006-2017)

- Annual deforestation rate (0.52) is relatively higher than any rate (0.12) before protection.
- TNR project management system needs to be more improved

Conclusions



Recommendations for PA





**Thank you very much
for your kind attention**