

5th UN-REDD Regional Lessons Learned Workshop Forest Monitoring Systems and Reference Levels for REDD



Establishing interim FRLs for PRAP of Lam Dong

OCTOBER 23, 2014
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Contents of the presentation

1. Preparation and decisions for establishing FRLs for PRAP Lam Dong.
2. Main steps of FRLs development (AD, EFs) and selection of FRLs.
3. Improvement needs.
4. Contributions for PRAP development.

Road for FRLs development



- Lam Dong Working Group – FRL establishment
- Carbon accounting and Carbon stratification training (SOP)
- FIPI -FREC , AFC– Forest Cover Change Assessment (AD)
- FIPI – Carbon Stock Analysis (Efs)
- USAID LEAF, WI – Technical Assistance
- Consultation Process
- Decision of Lam Dong on selection FRLs



Reference level Decisions Tool

1. Determine **Scope** of Activities

2. Finalize **Forest Definition**

3. Determine **Scale** (National or Summed Subnational)

4. Determine Which **Pools/Gases** to Include

5. Link REDD+ to a **National Forest Inventory?**

6. Adjust for **National Circumstances?**

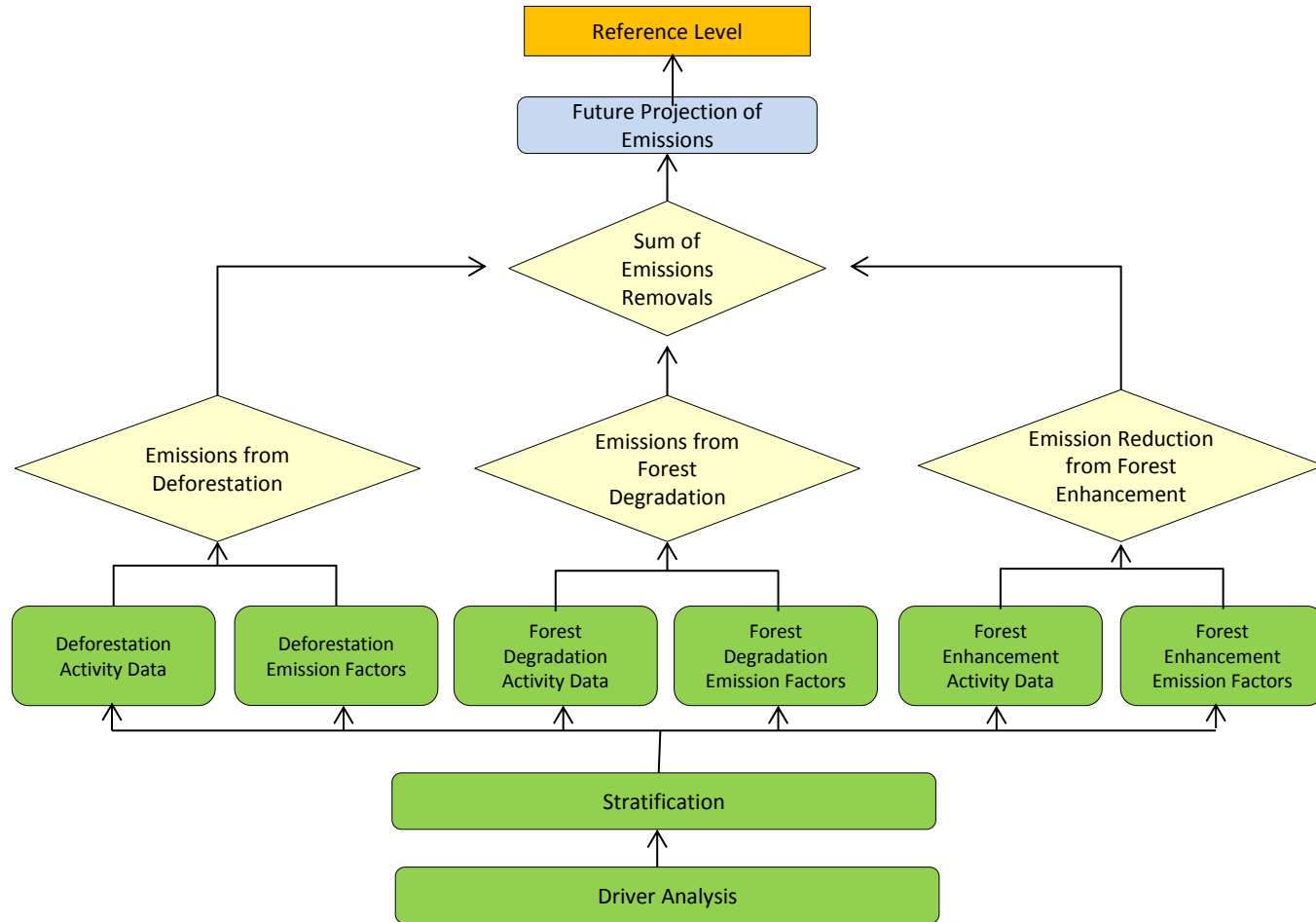
7. Should a **Location Analysis** Be Included?

Key Decision for REDD+ RL/REL

Lam Dong Decisions

1. Determine Scope of Activities	<ul style="list-style-type: none">• Include deforestation• Include forest degradation• Include forest enhancement
2. Finalize Forest Definition	<ul style="list-style-type: none">• Minimum tree cover: 10%• Minimum height: 5 m• Minimum area: 0.5 ha
3. Scale of REDD+ RL	Subnational
4. Pools/Gases	<ul style="list-style-type: none">• Measured Pools: Live tree aboveground biomass• Pools using default values: Dead wood, litter, soil carbon, and live tree belowground biomass• Gases: CO₂
5. Link REDD+ to National Forest Inventory?	Yes
6. Adjust for National Circumstances?	To be determined.
7. Location Analysis?	Possibly in the future, to be determined.

Modality for establishing of FRLs of PRAP Lam Dong



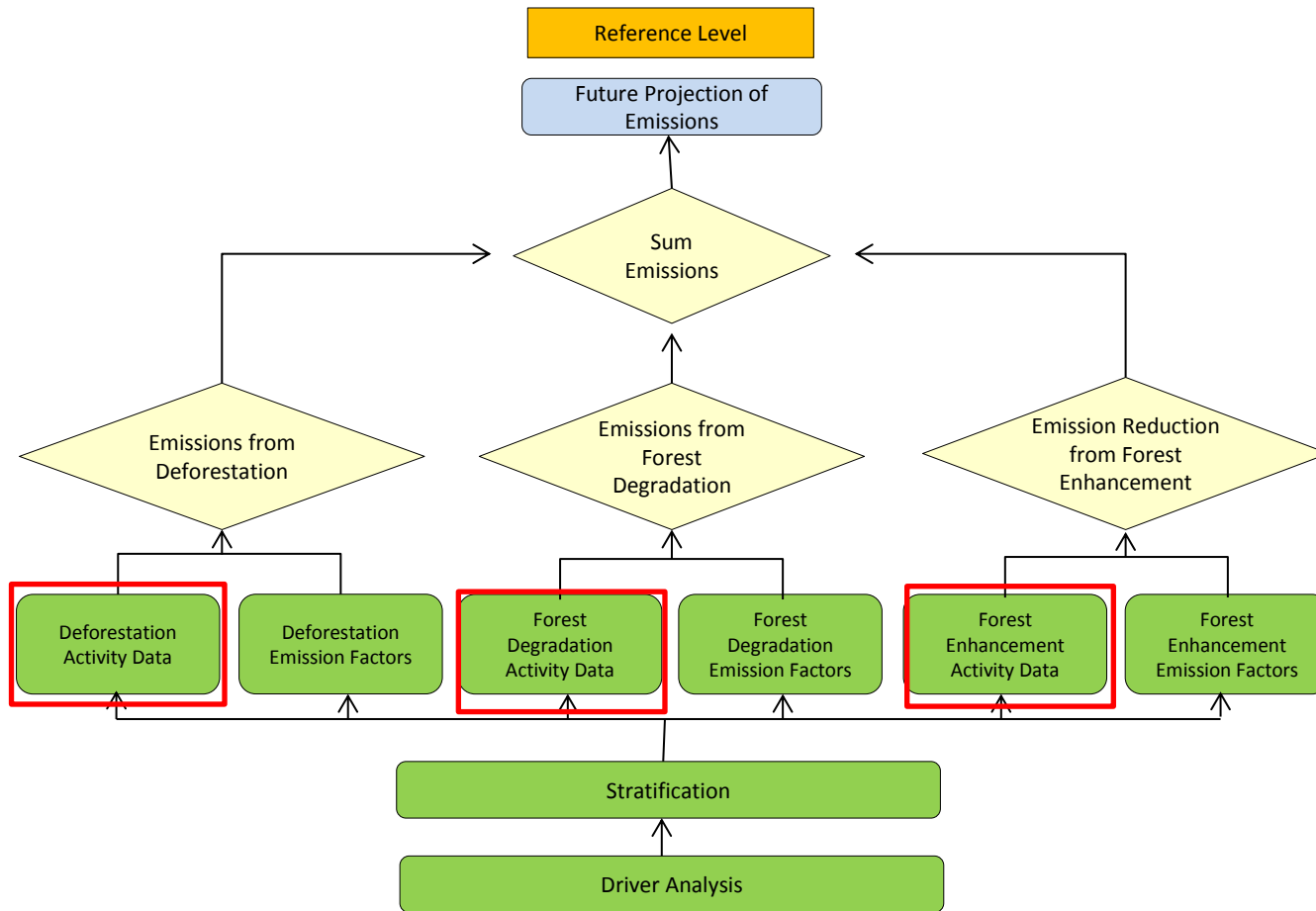
Main steps of FRLs development (AD, EFs) and selection of FRLs



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Activity Data



Stratification

Forest/ land cover class

Evergreen - Broadleaf - Rich

Evergreen - Broadleaf - Medium

Evergreen - Broadleaf - Poor

Evergreen - Broadleaf - Regrowth

Deciduous

Bamboo forest

Mixed Wood and Bamboo

Coniferous - Rich

Coniferous - Medium

Coniferous - Poor

Coniferous - Regrowth

Mixed Broadleaf and Coniferous

Plantation

Bare land

Agricultural and other land

Water area

Residential area

- According Circular 34 Circular No. 34/2009/TT-BNNPTNT of June 10, 2009
 - Given the mosaic pattern of forests
 - Consistency with national context

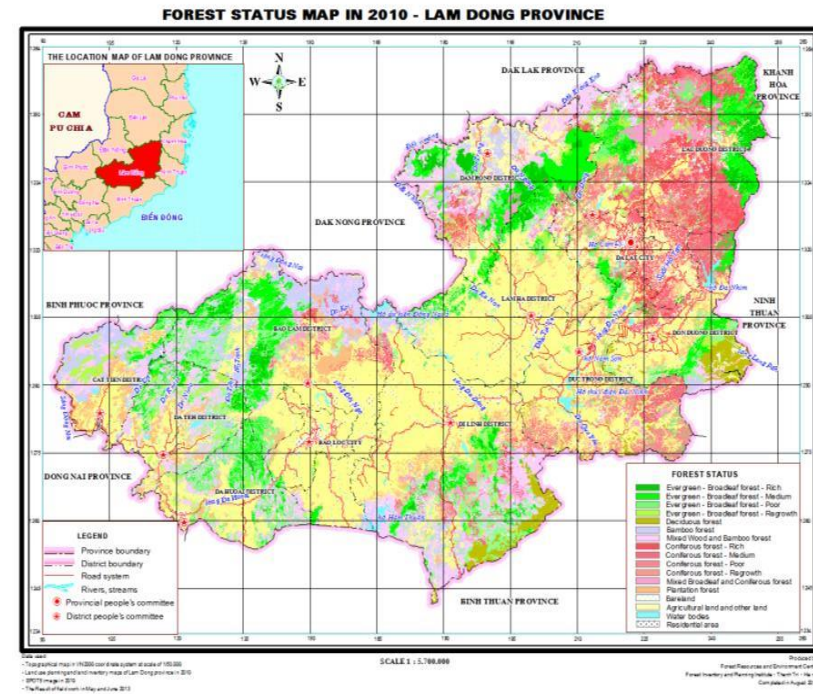


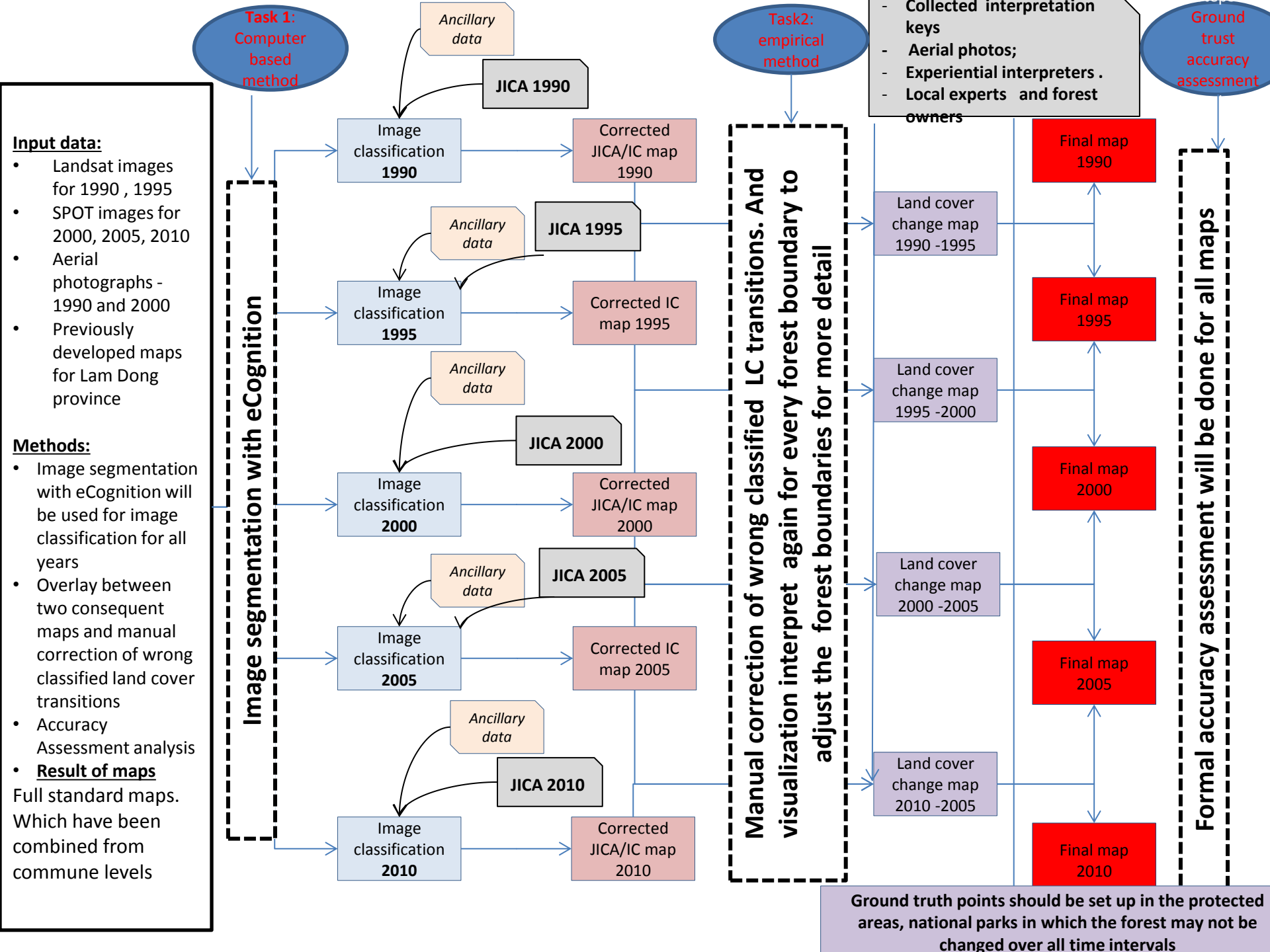
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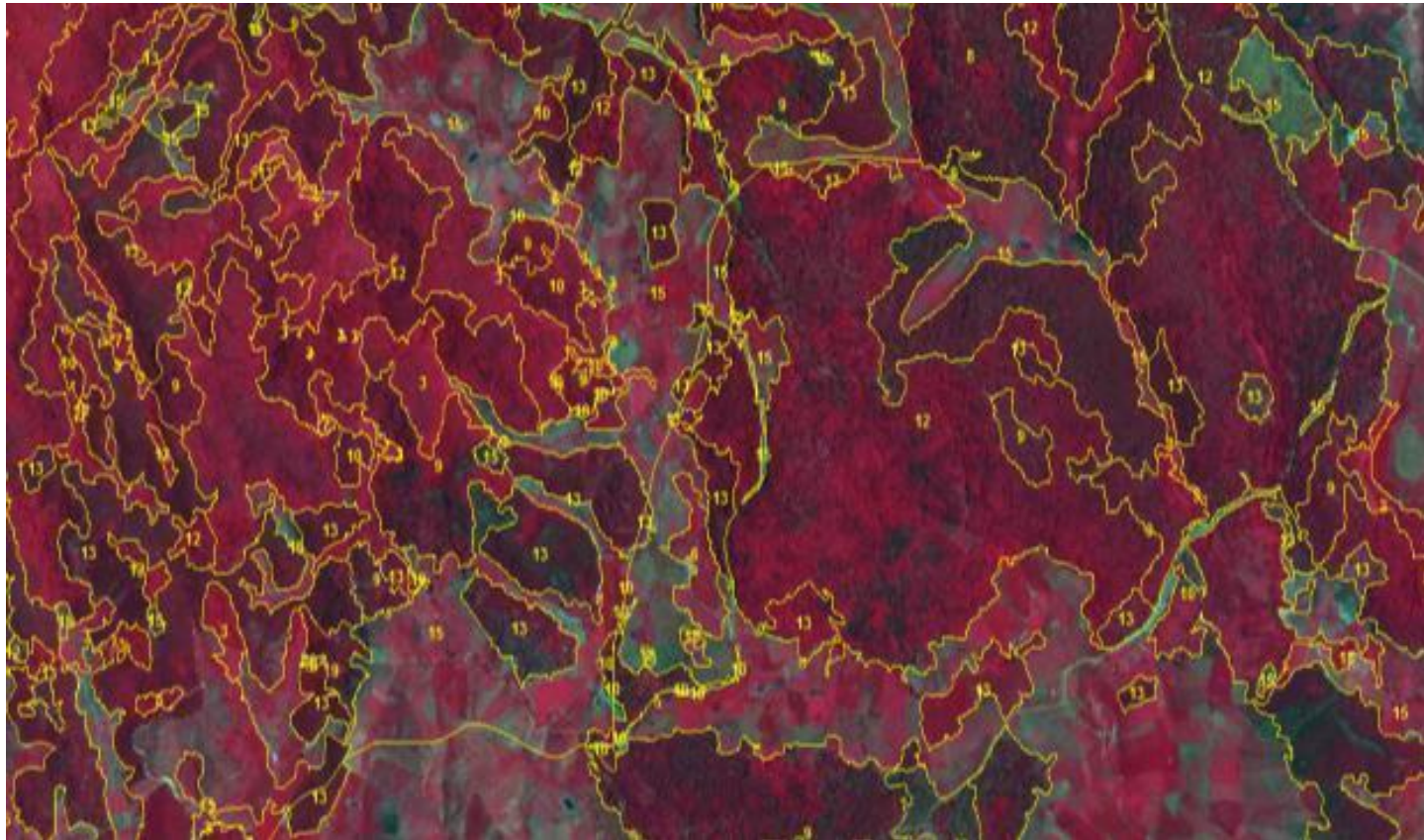
Lam Dong Activity Data

- Activity Data for deforestation, forest degradation and afforestation/reforestation
- Historical periods: 1990-1995, 1995-2000, 2000-2005, 2005-2010
- Derived from pairwise comparison of FREC land cover maps for 1990, 1995, 2000, 2005 and 2010
- Landsat and SPOT satellite images
- Forest knowledge from local partners
- Thirteen forest/land cover classes





Classification result of historical forest cover maps



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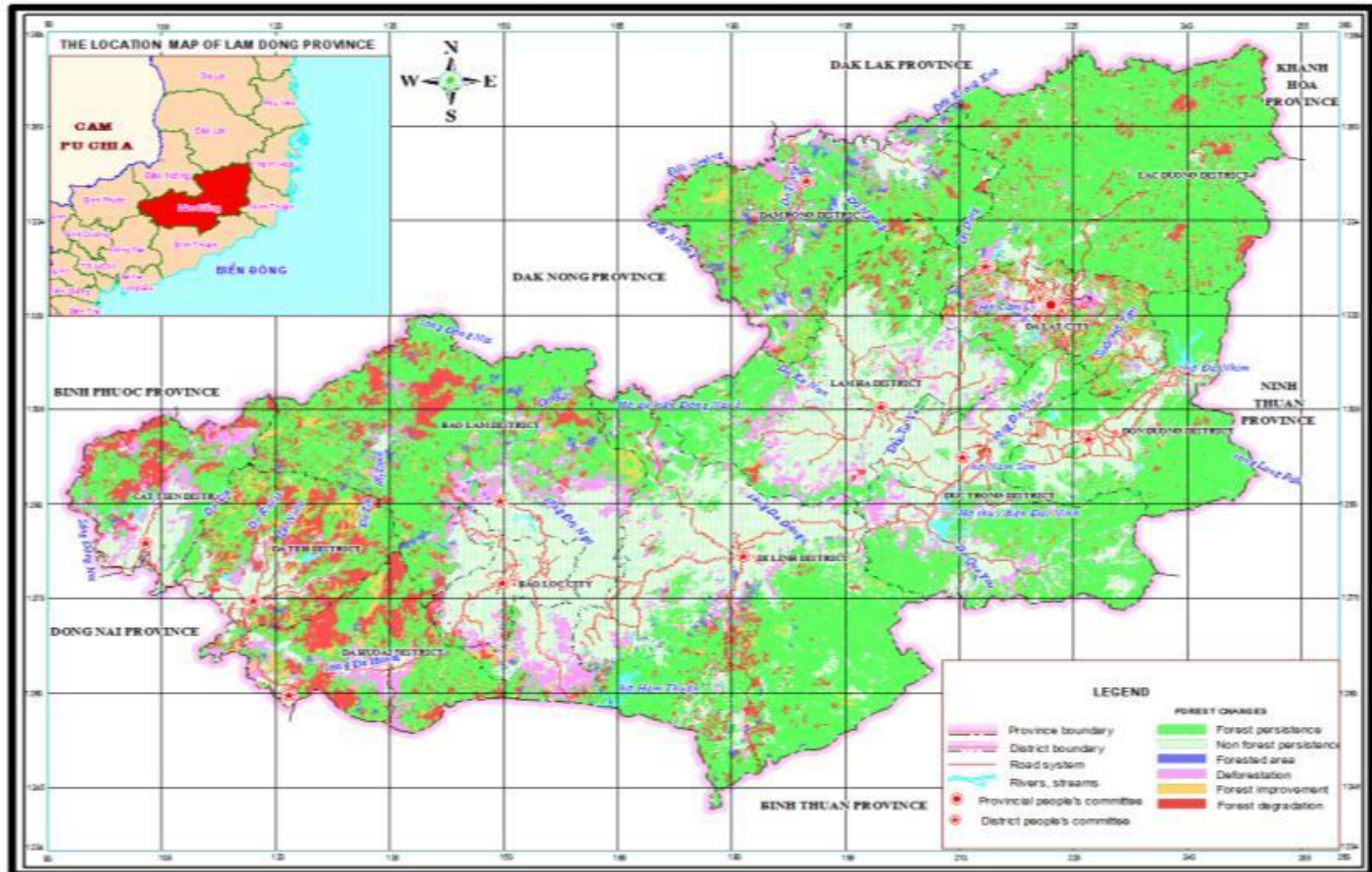
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Field check and finalization



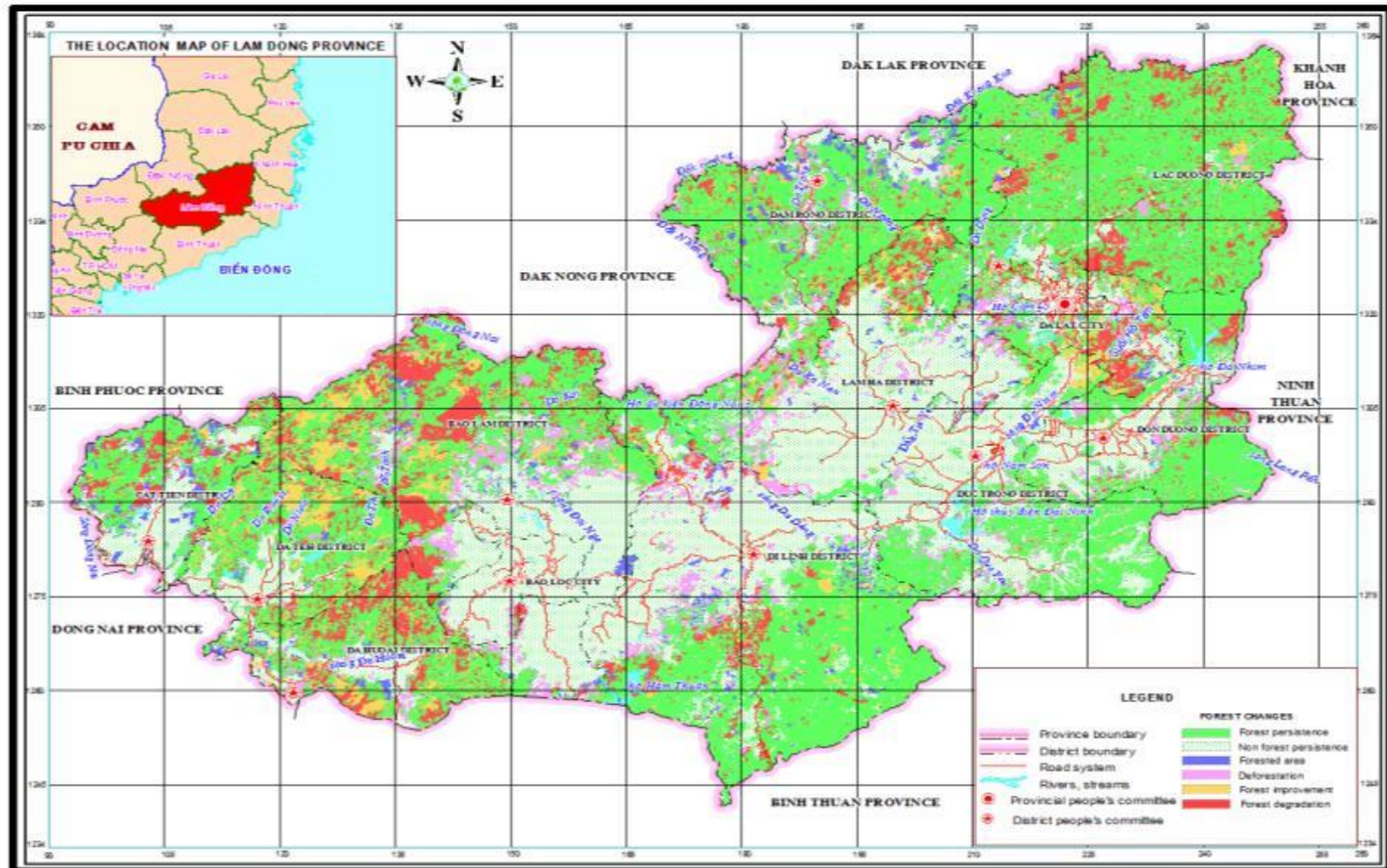
Forest and land use change map of Lam Dong Province in 1990 – 1995

FOREST AND LAND USE CHANGE MAP OF LAM DONG PROVINCE IN 1990 - 1995



Forest and land use change map of Lam Dong Province in 1995 – 2000

FOREST AND LAND USE CHANGE MAP OF LAM DONG PROVINCE IN 1995 - 2000



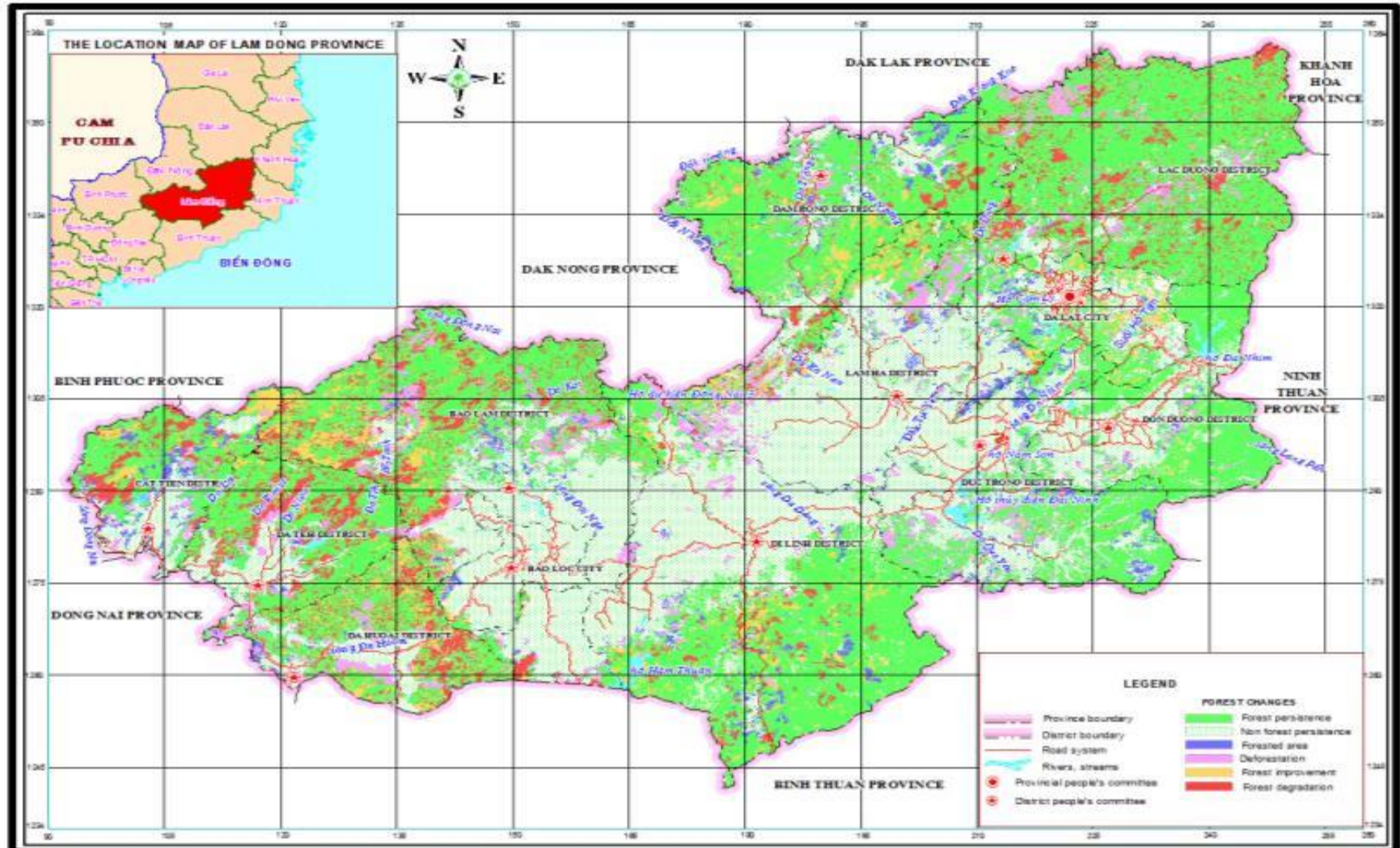
Date used:
 - Topographical map in UTM2000 coordinate system at scale of 1:80,000
 - Forest and land use maps of Lamdong province - Cycle 2 and cycle 3
 - Land use planning and land inventory maps of Lam Dong province in 1999 and 2000
 - Landsat TM in 2000, Landsat TM in 1989

SCALE 1 : 5,700,000

Prepared by:
 Forest Resources and Environment Center
 Forest Inventory and Planning Institute - Hanoi VI - Hanoi
 Completed in August 2010

Forest and land use change map of Lam Dong Province in 2000 – 2005

FOREST AND LAND USE CHANGE MAP OF LAM DONG PROVINCE IN 2000 - 2005

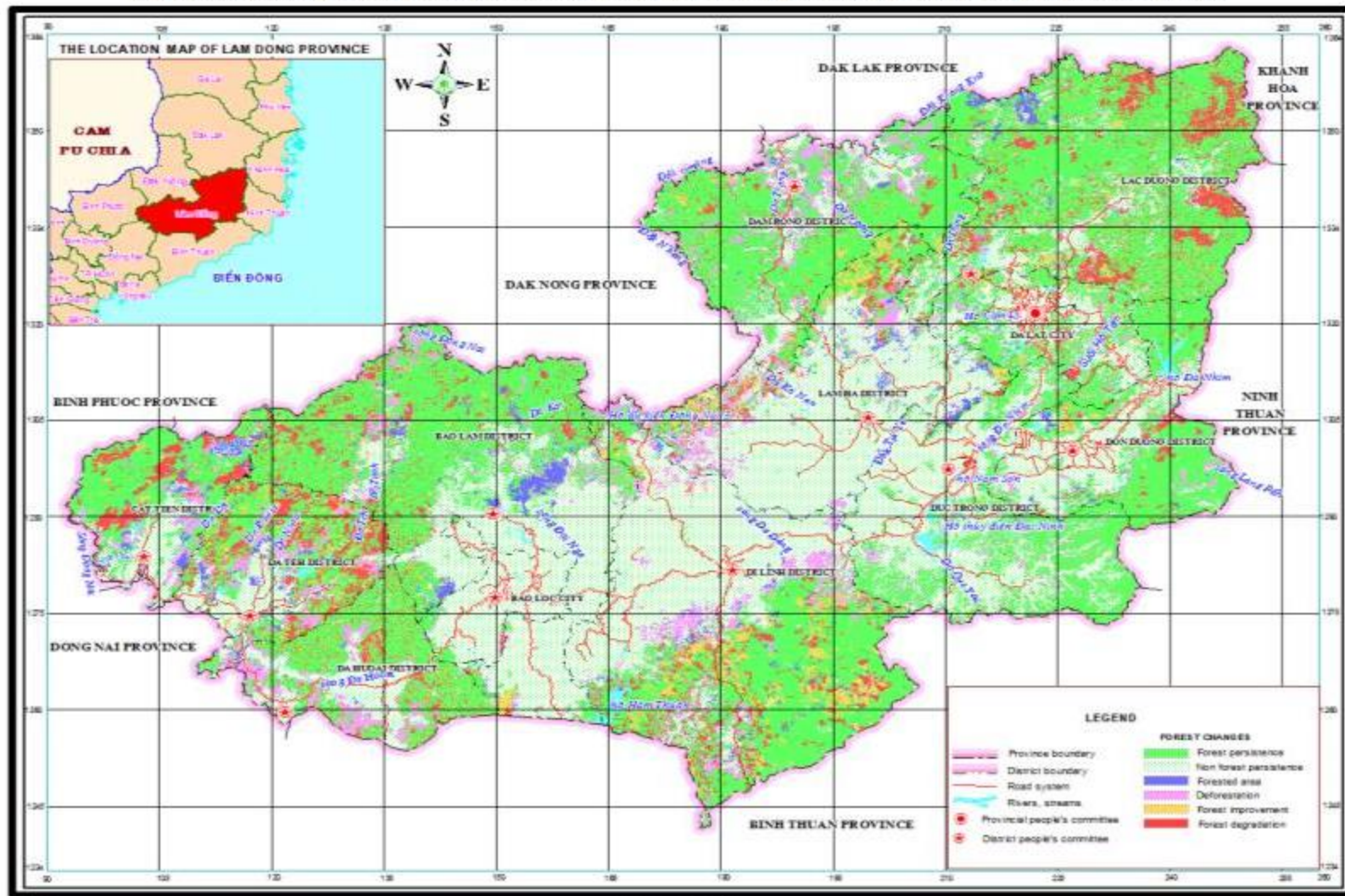


© 2006 USAID
 *Topographical map in UTM2000 coordinate system at scale of 1:50,000
 *Land use planning and land inventory maps of Lam Dong province in 2000 and 2005
 *Forest and land use maps of Lam Dong province - Cycle 2
 *SP-075 made in 2005 and Lam Dong/Nov in 2005

SCALE 1 : 5,700,000

Forest and land use change map of Lam Dong Province in 2005 – 2010

FOREST AND LAND USE CHANGE MAP OF LAM DONG PROVINCE IN 2005 - 2010

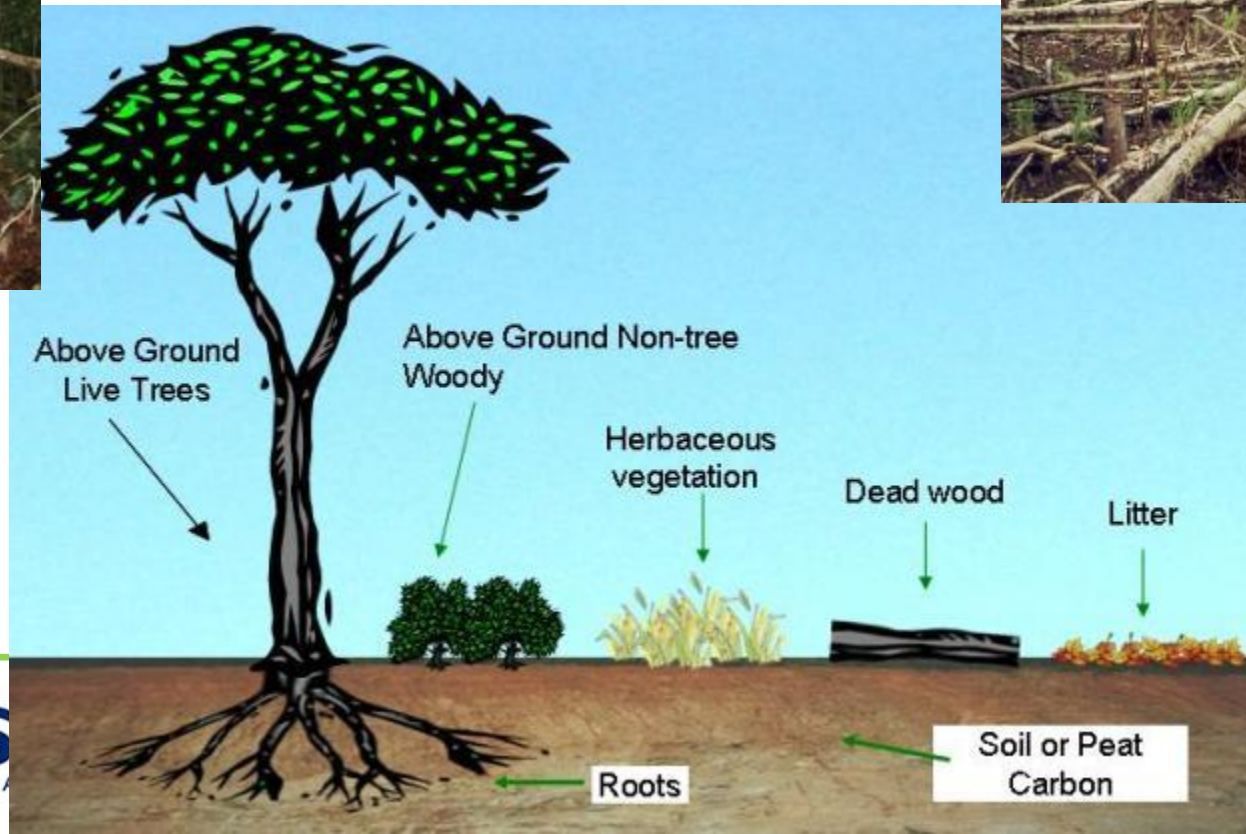


Scale 1 : 5,700,000

- Topographic map in UTM2000 coordinate system at scale of 1:60,000
 - Land use planning and land inventory maps of Lam Dong province in 2005 and 2010
 - Forest and non-forest maps of Lam Dong province - Cycle 3, Cycle 4
 - GPS image in 2005 and 2010
 - The Reason of forest in May and June 2010

Emission Factors

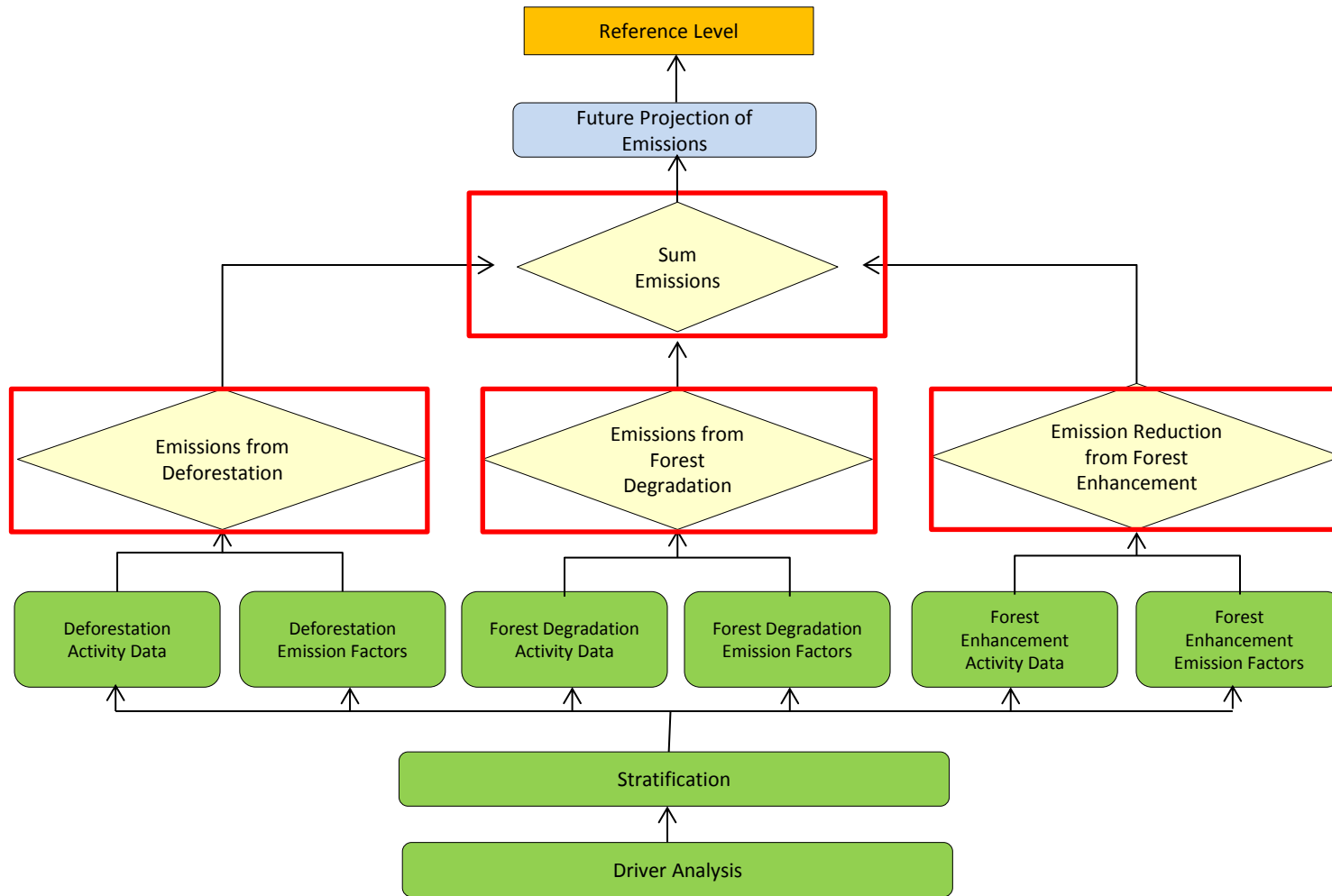
The carbon stocks for each forest stratum undergoing change is determined to define emission factors



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Emissions



Lam Dong Emission Factors, and pools

- For deforestation, degradation, and afforestation/reforestation
- Live tree carbon stock estimates from NFIMAP Cycle IV raw field data (2006-2010), collected by FIPI
- Litter, dead wood and soil carbon pools based on IPCC defaults
- Post deforestation land uses: Agriculture, Settlements, Bare Land (assumed 0 t CO₂e)

Carbon Stocks



Forest Carbon Stratum/ Forest type	Live Tree Carbon Stock (t C.ha ⁻¹)	Uncertainty (%)
Evergreen - Broadleaf forest - Rich	123.53	11.7
Evergreen - Broadleaf forest - Medium	97.28	13.7
Evergreen - Broadleaf forest - Poor	56.28	29.3
Evergreen - Broadleaf forest - Regrowth	46.28	43.3
Deciduous forest	40.42	148.4
Bamboo forest	2.12	213.0
Mixed Broadleaf and Coniferous forest	72.07	79.5
Coniferous forest - Rich	80.64	20.7
Coniferous forest - Medium	67.67	13.5
Coniferous forest - Poor	48.02	41.7
Coniferous forest – Regrowth*	40.28	43.3
Mixed Wood and Bamboo forest	40.10	22.0
Plantation forest	22.86	96.1

Carbon stocks for each stratum



Forest type	Sum of Average Carbon Stocks (tC/ha)	Average tree Carbon Stocks (tC/ha)	Default IPCC Dead Wood Carbon Stocks (tC/ha)	Default IPCC Litter Carbon Stocks (tC/ha)
Evergreen - Broadleaf forest - Rich	126	124	1.2	1.2
Evergreen - Broadleaf forest - Medium	99	97	1.0	1.0
Evergreen - Broadleaf forest - Poor	57	56	0.6	0.6
Evergreen - Broadleaf forest - Regrowth	47	46	0.5	0.5
Deciduous forest	41	40	0.4	0.4
Bamboo forest	2	2	0.0	0.0
Mixed Broadleaf and Coniferous forest	74	72	0.7	0.7
Coniferous forest - Rich	82	81	0.8	0.8
Coniferous forest - Medium	69	68	0.7	0.7
Coniferous forest - Poor	49	48	0.5	0.5
Coniferous forest – Regrowth(*)	24	23	0.2	0.2
Mixed Wood and Bamboo forest	41	40	0.4	0.4
Plantation forest	23	23	0.2	0.2

Matrix of Land Use Change

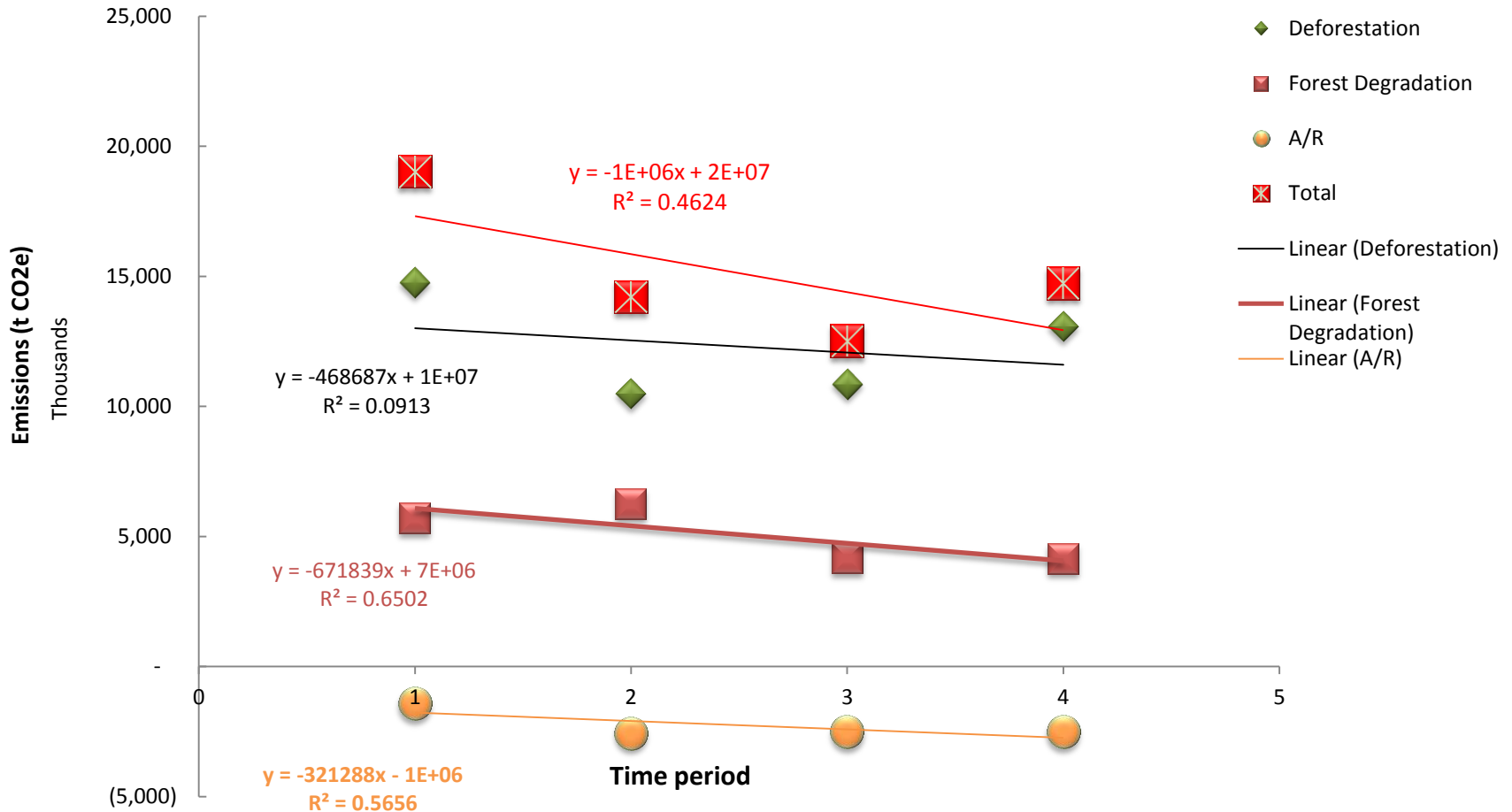


Forest Type	Average emission factor from deforestation (t C/ha)		
	Agriculture	Bare land	Residential/ infrastructure
Evergreen - Broadleaf forest - Rich	150	140	135
Evergreen - Broadleaf forest - Medium	124	113	109
Evergreen - Broadleaf forest - Poor	82	72	67
Evergreen - Broadleaf forest - Regrowth	72	61	57
Deciduous forest	66	55	51
Bamboo forest	27	16	12
Mixed Broadleaf and Coniferous forest	98	88	83
Coniferous forest - Rich	106	91	91
Coniferous forest - Medium	93	78	78
Coniferous forest - Poor	73	58	58
Coniferous forest – Regrowth	48	38	33
Mixed Wood and Bamboo forest	65	65	50
Plantation forest	48	48	33

Lam Dong Emissions

- Emissions from deforestation from 1990-2010 were 49.2 million t CO₂e; annual average of 2.46 million t CO₂e
- Emissions from degradation were 20.3 million t CO₂e, with an annual average of 1.01 million t CO₂e .
- Removals from A/R were 9.0 million t CO₂e, with an annual average of 450 thousand t CO₂e
- **Total combined net emissions for the province from 1990-2010 were 60.5 million tons CO₂e, with an annual average of 3.02 million t CO₂e.**

Lam Dong Emissions



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Establishing the RL



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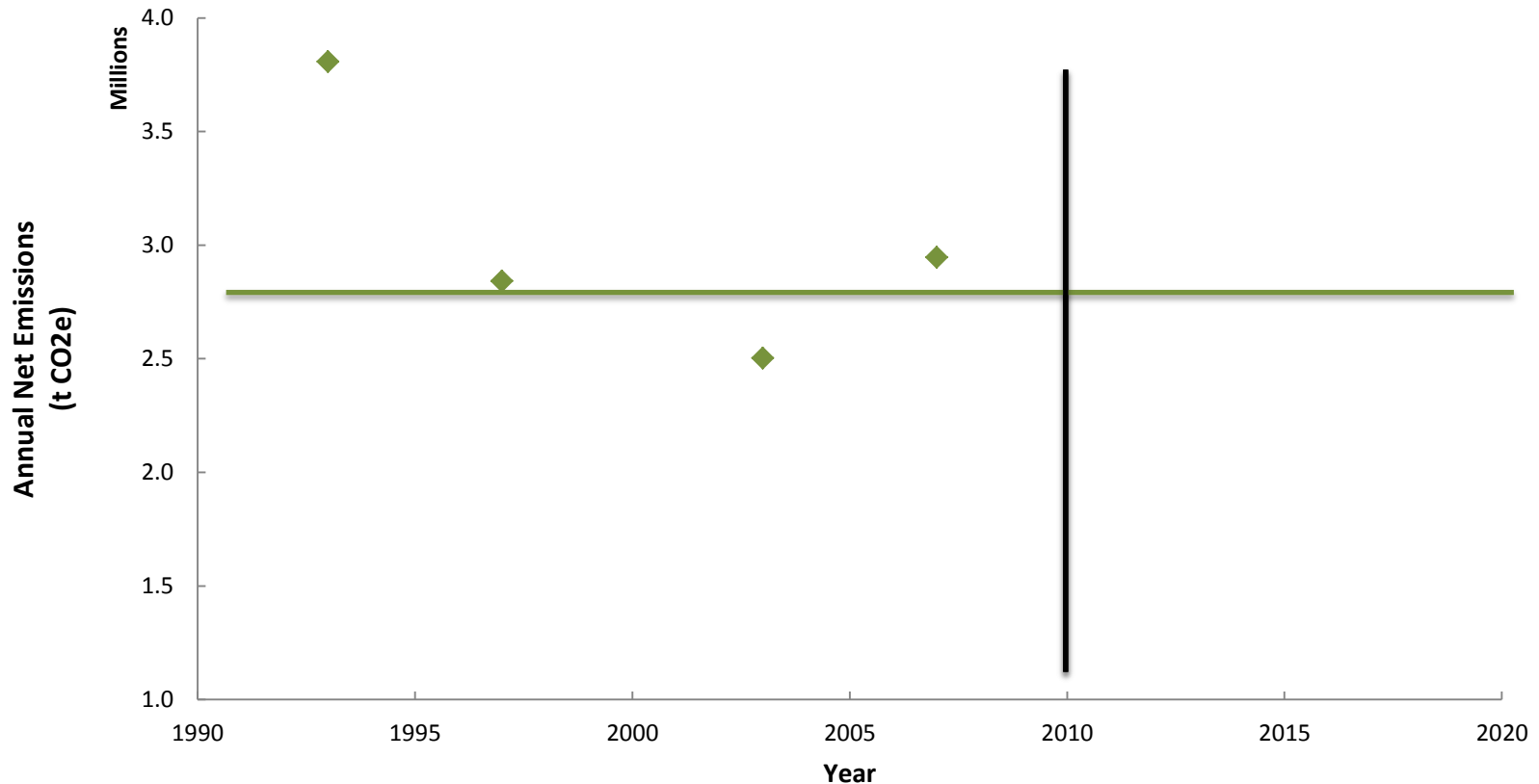


Establishing the RL

- The options presented for a projected RL are until 2020 or 10 years from the base year (2010).
 - **Average**
 - Continuation of historical trend
 - Adjusted for national (subnational) circumstances RL
- Regardless of the RL that Lam Dong decides to follow, the emissions after 2010 (the start year of REDD+) must fall below the trend line for Lam Dong to demonstrate successful performance.

Average net RL for Lam Dong

The **average RL** is set as continuation of historical average.



Possible Improvements

- Improved inventory data, specific for carbon stock estimates, including all relevant pools, strata, and post-deforestation land uses
- Develop EFs appropriate for older historical periods (or reduce reference period to 2000-2010)
- Increasing the number of measurements (in this case plots) can help reduce uncertainty associated with precision
- Refining the strata to reduce variation with a forest type can also reduce uncertainty



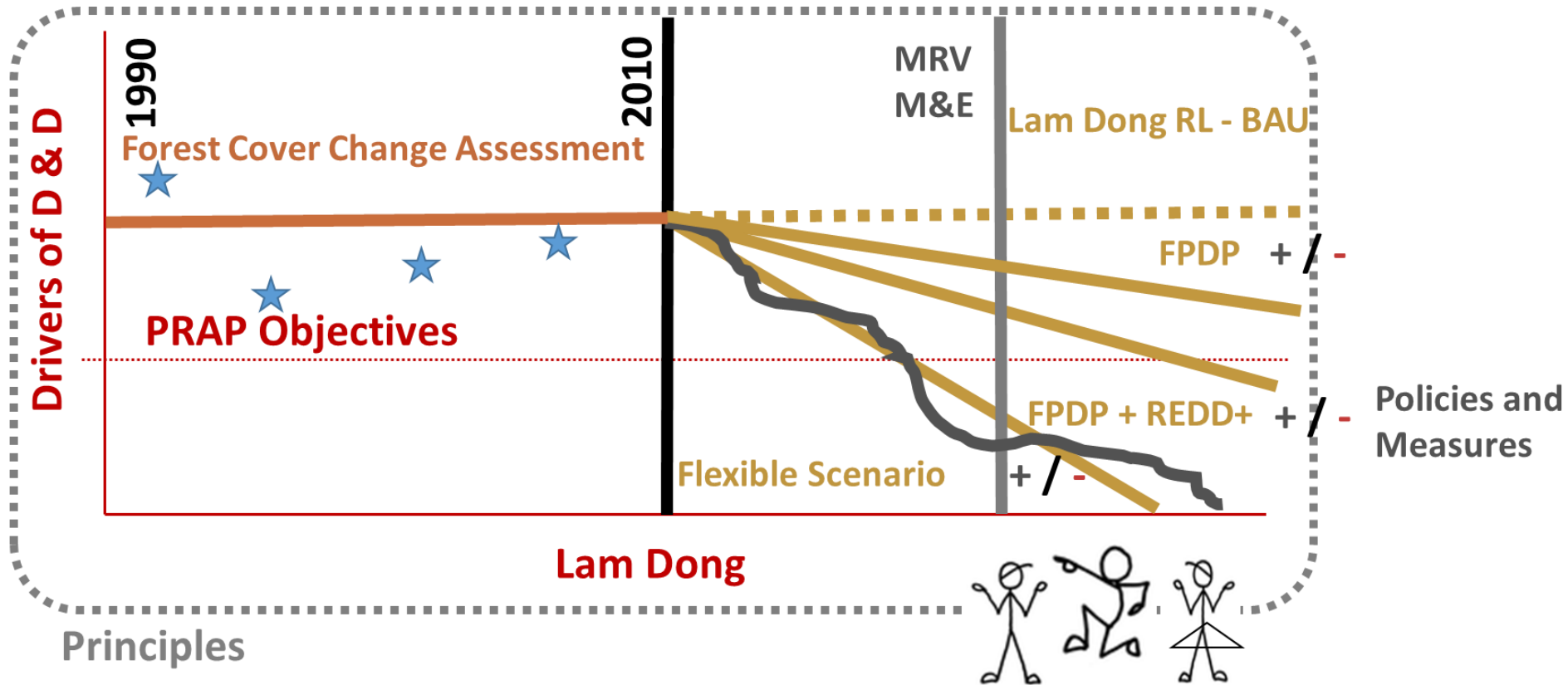
Contributions for PRAP development



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Lam Dong PRAP – Scenario Analysis



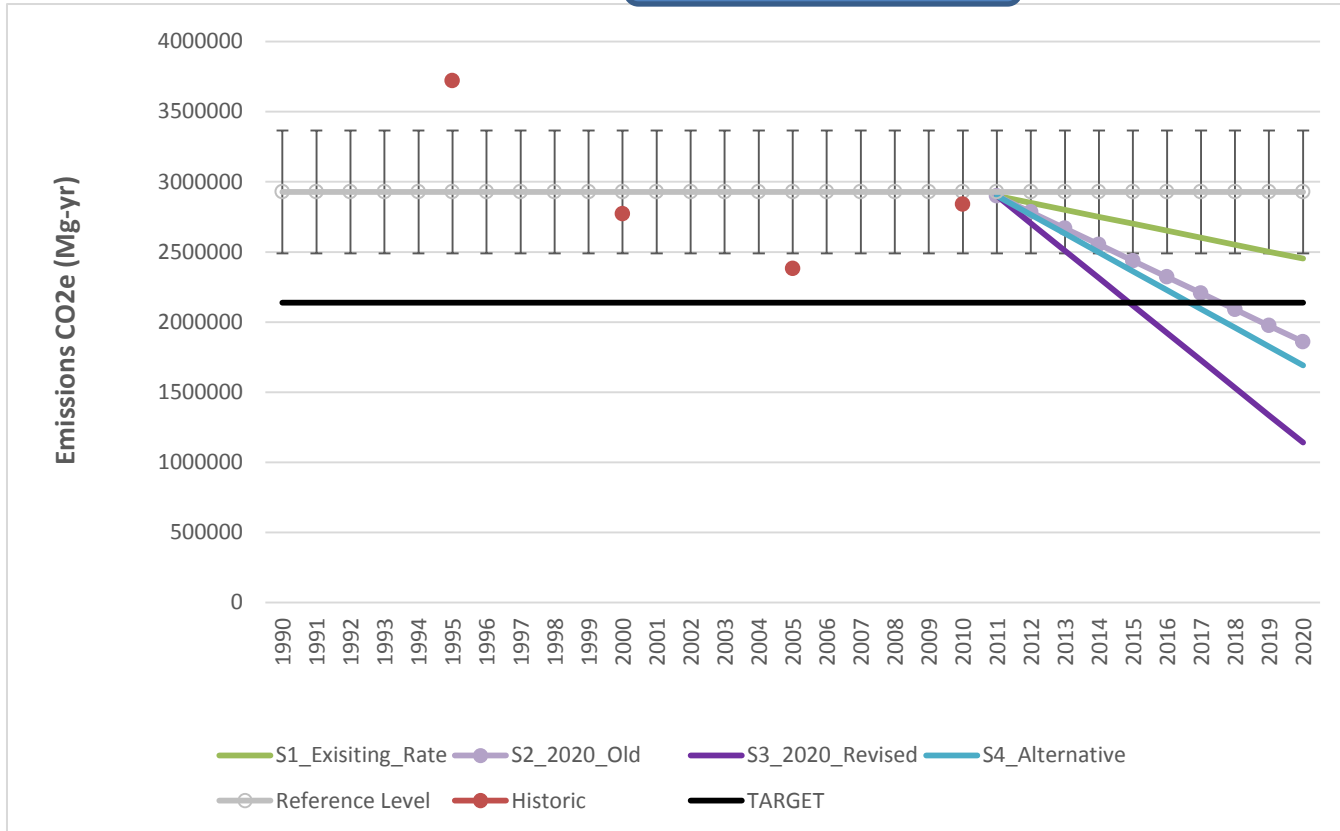
Scenario model

AR(LD)_ha
 Deforestation (LD)_ha
 Degradation (LD)_ha
 Enhancement (LD)_ha

	50%
	-40%
	-50%
	50%

Run S4 Model

Export S4 GIS LUT



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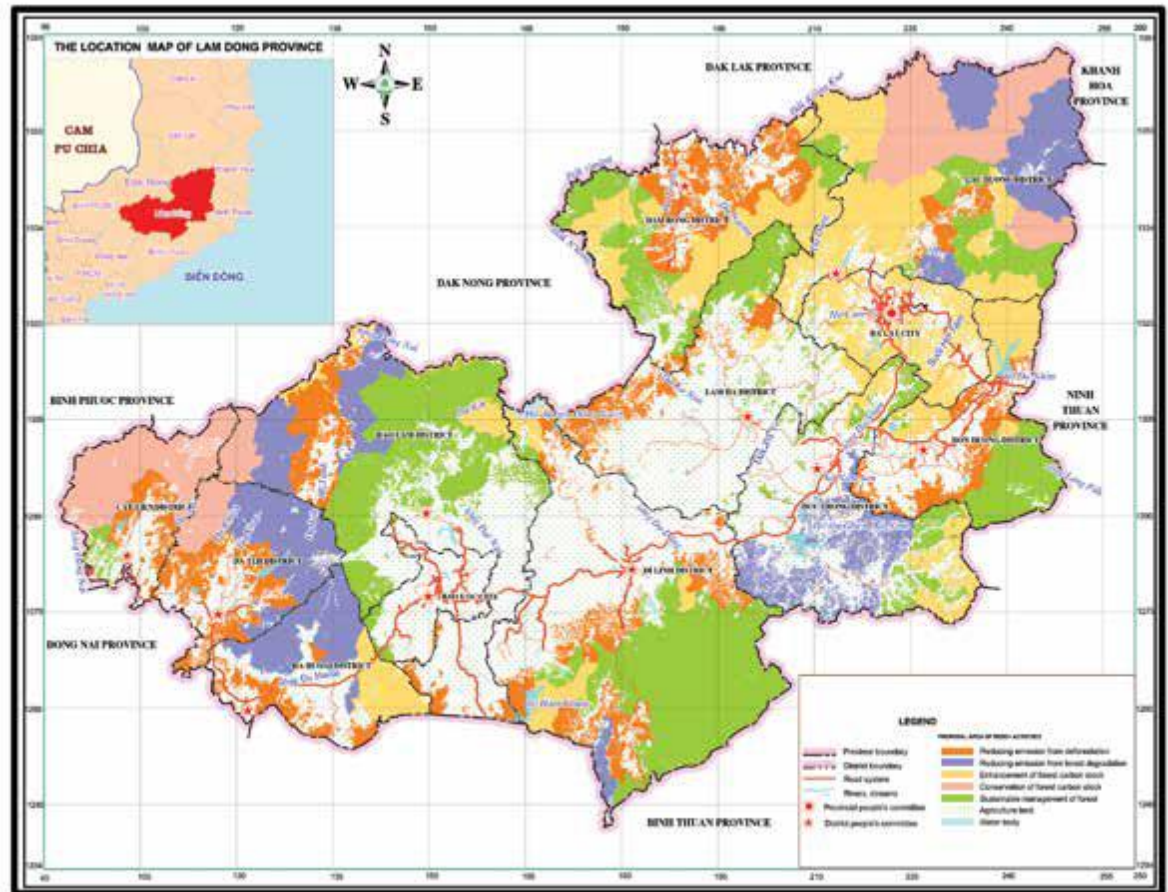


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Intervention REDD+ activities

- The most appropriate Scenario will be selected
- PaMs selected
- Pilot Intervention REDD+ determined
- Take in to consideration both emission reduction and Non Carbon issues

PROPOSAL MAP FOR IMPLEMENTING REDD+ ACTIVITIES IN LAM DONG PROVINCE



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