# Technical option of REL/RL development

## -Information for REL/RL development and idea for national forest monitoring system –

**Development of NFMS and MRV system for REDD+**
**-Learning from Demonstration Activities-**
**May 21, 2012**


JICA Expert
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# Contents of presentation

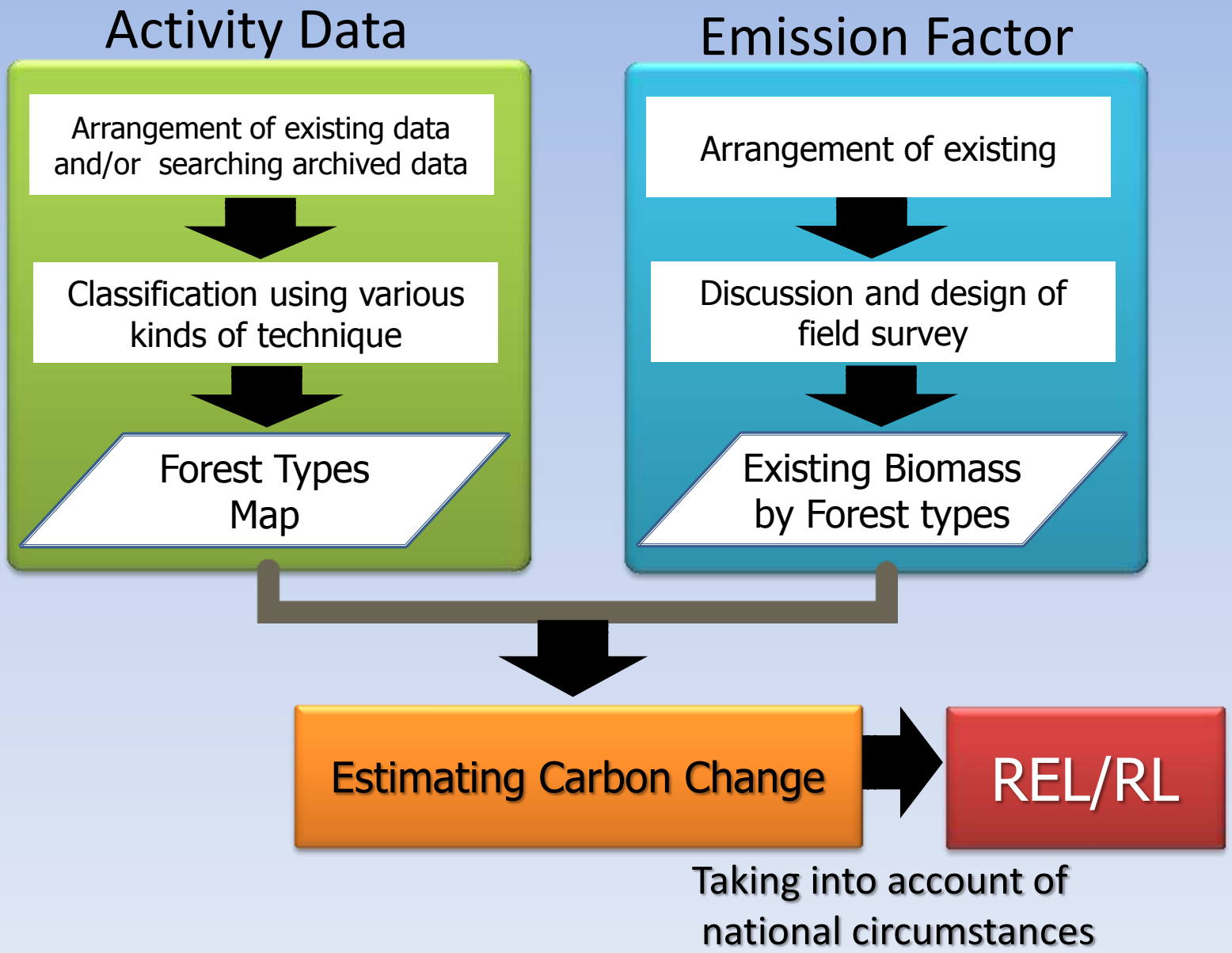
- Development of interim REL/RL in national scale (Case study in Vietnam)
- Stepwise approach for development of National Forest Monitoring System

# Development of interim REL/RL in national scale

**"Study on Potential Forests and Land Related to Climate Change and Forests"**
**funded by JICA**

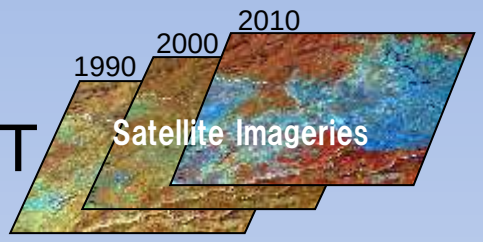
1. Development of Activity Data using RS data
2. Development of Emission Factor using NFI
3. Setting interim RL/RELs for REDD

# Methodology for estimating carbon change

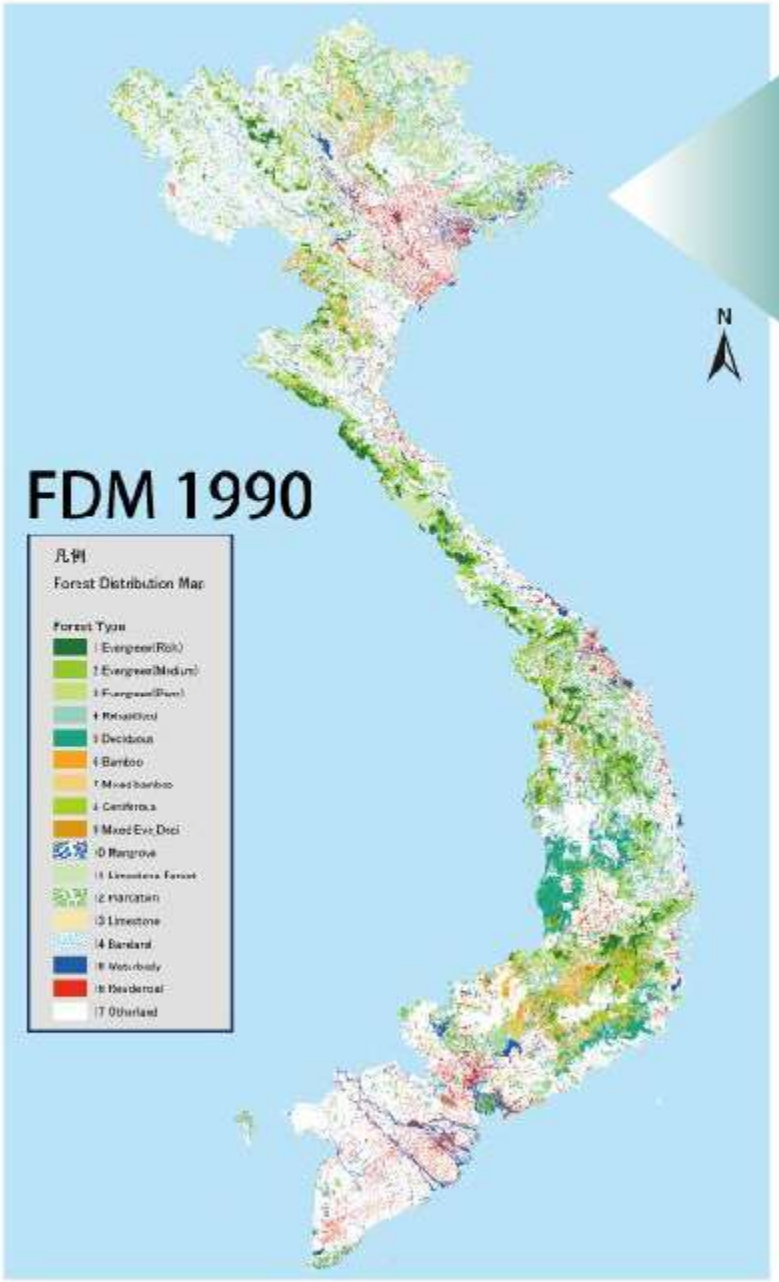


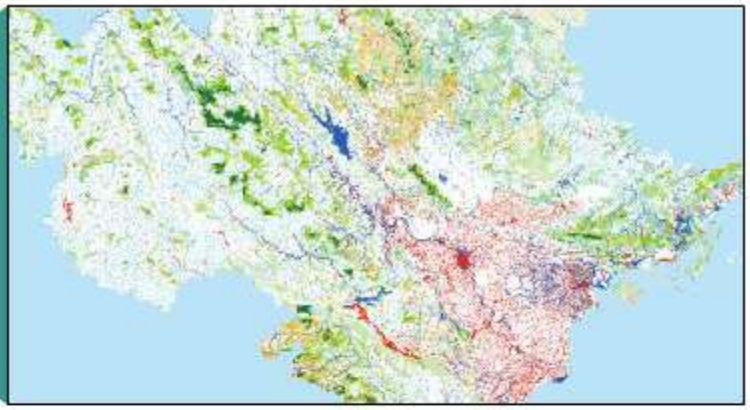
# Development of the forest distribution maps (Utilizing existing Data)

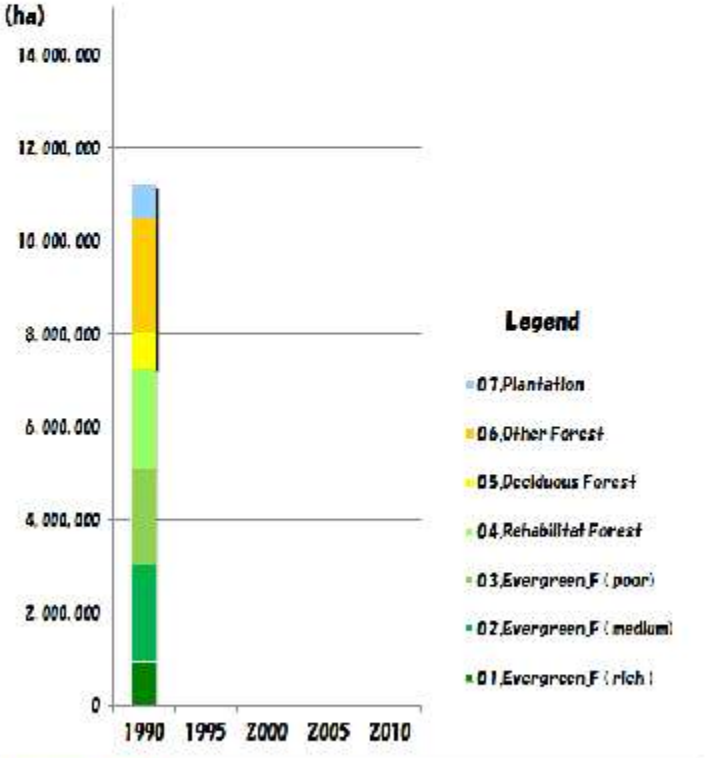
- RS imagery
  - 1st cycle 1991 – 1995: Landsat TM
  - 2nd cycle 1996 – 2000: Landsat TM+SPOT
  - 3rd cycle 2001 – 2005: Landsat ETM+
  - 4th cycle 2006 - 2010: SPOT5
- Visual interpretation and correction through field surveys
- Over 30 detailed LU/LC categories




Classification

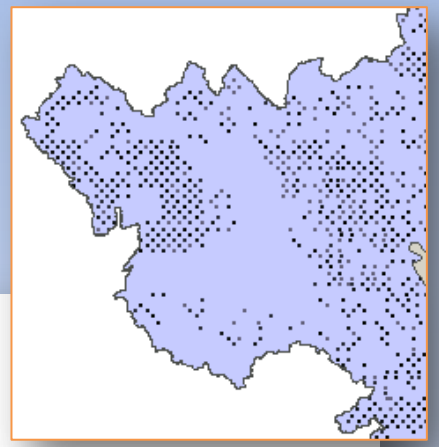

FDM 1990
凡例
Forest Distribution Map
Forest Type
1 Evergreen(Rich)
2 Evergreen(Medium)
3 Evergreen(Poor)
4 Rehabilitat
5 Deciduous
6 Bamboo
7 Mixed bamboo
8 Coniferous
9 Mixed Ev. Deci
10 Mangrove
11 Limestone Forest
12 Plantation
13 Limestone
14 Bareland
15 Waterbody
16 Residential
17 Otherland
N

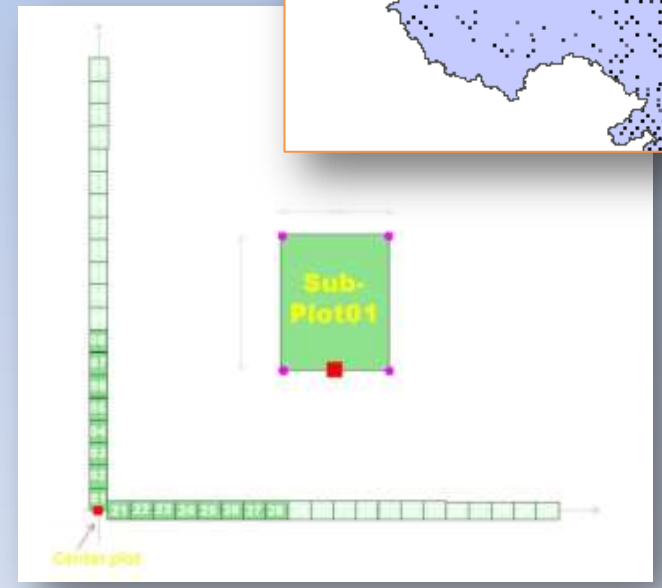



(ha)
14.000.000
12.000.000
10.000.000
8.000.000
6.000.000
4.000.000
2.000.000
0
1990
1995
2000
2005
2010
Legend
07,Plantation
06,Other Forest
05,Deciduous Forest
04,Rehabilitat Forest
03,Evergreen,F ( poor)
02,Evergreen,F ( medium)
01,Evergreen,F ( rich )

# Arrangement of the national forest inventory data (Utilizing existing Data)

- A sample plot system
- 4 cycles from 1991 with 5 years interval
  - 1st cycle 1991 – 1995: 3,000 Plots
  - 2nd cycle 1996 – 2000: 3,800 Plots
  - 3rd cycle 2001 – 2005: 4,200 Plots
  - 4th cycle 2006 - 2010: 2,100 Plots
- 8km systematic sampling
- 1 plot consisting with 40sub-plots
- Sub-Plot size=20m × 25m Rectangle





# Arrangement of the national forest inventory data Results:(Mean AGB+BGB par Regions and F.Types)

($CO_2$t/ha)

| ※1 \ ※2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 181 | 157 | | | | | | | | 75 |
| 2 | 604 | 282 | 144 | 157 | 178 | | 279 | | | | | |
| 3 | | | | | | | | | | 115 | | 104 |
| 4 | 798 | 299 | | | | | | | | | | |
| 5 | 508 | 275 | 158 | 131 | | 78 | 219 | 92 | | | | 67 |
| 6 | 516 | 272 | 135 | 94 | | 66 | 118 | | | | 165 | 103 |
| 7 | 417 | 272 | 171 | 116 | | 82 | 181 | 146 | | | | 70 |
| 8 | | | | | | | | | | | | |
| 9 | | 271 | 110 | 115 | | 86 | 122 | | 105 | 4 | | 85 |
| 10 | 465 | 282 | 158 | 148 | 196 | 138 | 249 | | | | | 94 |
| 11 | 502 | 291 | 162 | 135 | 153 | 91 | 199 | 253 | 292 | | | 163 |
| 12 | 511 | 280 | 120 | 128 | 189 | 104 | 240 | | 271 | | | 106 |
| 14 | | | | | | | | | | | | 102 |

※1 (Bio-ecoregions);1=Cardamom Mountains rain forests, 2=Central Indochina dry forests, 3=Indochina mangroves, 4=Luang Prabang montane rain forests, 5=Northern Annamites rain forests, 6=Northern Indochina subtropical forests, 7=Northern Vietnam lowland rain forests, 8=Red River freshwater swamp forests, 9=South China-Vietnam subtropical evergreen forests, 10=Southeastern Indochina dry evergreen forests
11=Southern Annamites montane rain forests, 12=Southern Vietnam lowland dry forests, 14=Tonle Sap-Mekong peat swamp forests

※2 (Forest types) ; 1=Evergreen broadleaf forest(rich forest), 2=Evergreen broadleaf forest(medium forest), 3=Evergreen broadleaf forest(poor forest), 4=Evergreen broadleaf forest(rehabilitationr forest), 5=Deciduous forest, 6=Bamboo forest, 7=Mixed timber and bamboo forest, 8=Coniferous forest, 9=Mixed broadleaf and coniferous forest, 10=Mangrove forest, 11=Limestone forest, 12=Plantation

# Activity data and emission factor

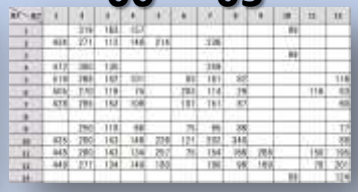





90’～95’

95’～00’

00’～05’



00’～10’

How to cook these basic information to identify carbon changes

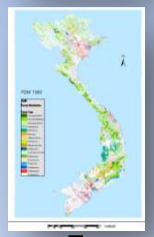
# Technical Option when estimation of carbon change

| Item to be considered | Option 1 | Option 2 |
|---|---|---|
| Method of calculation | Integrating emission and removal | Separating emission and removal |
| Units of aggregation | National scale | Regional scale by administrative units |

# Technical options when estimation of carbon change (Methods of calculation)

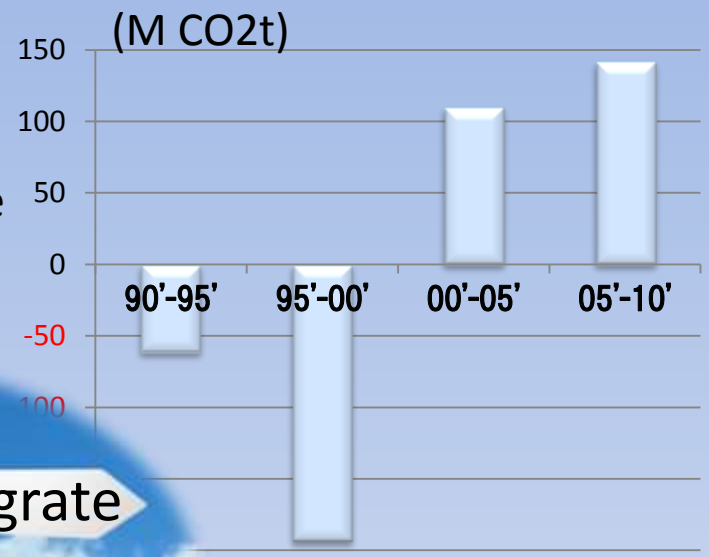


C Stock in 1990 (Ct)



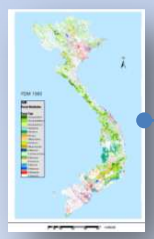
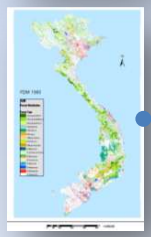
C Stock in 1995 (Ct)

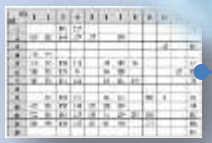
C Stock Change 1990 to 1995



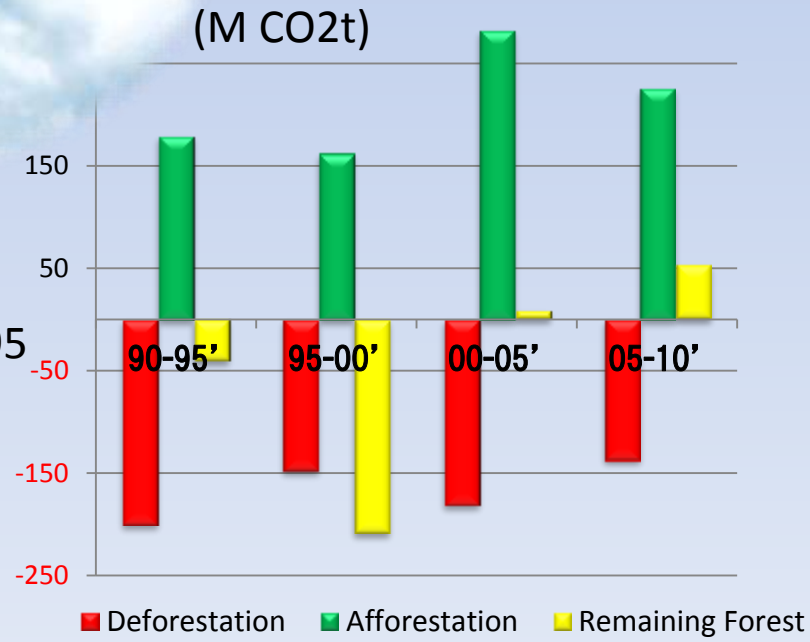

Separate

Integrate

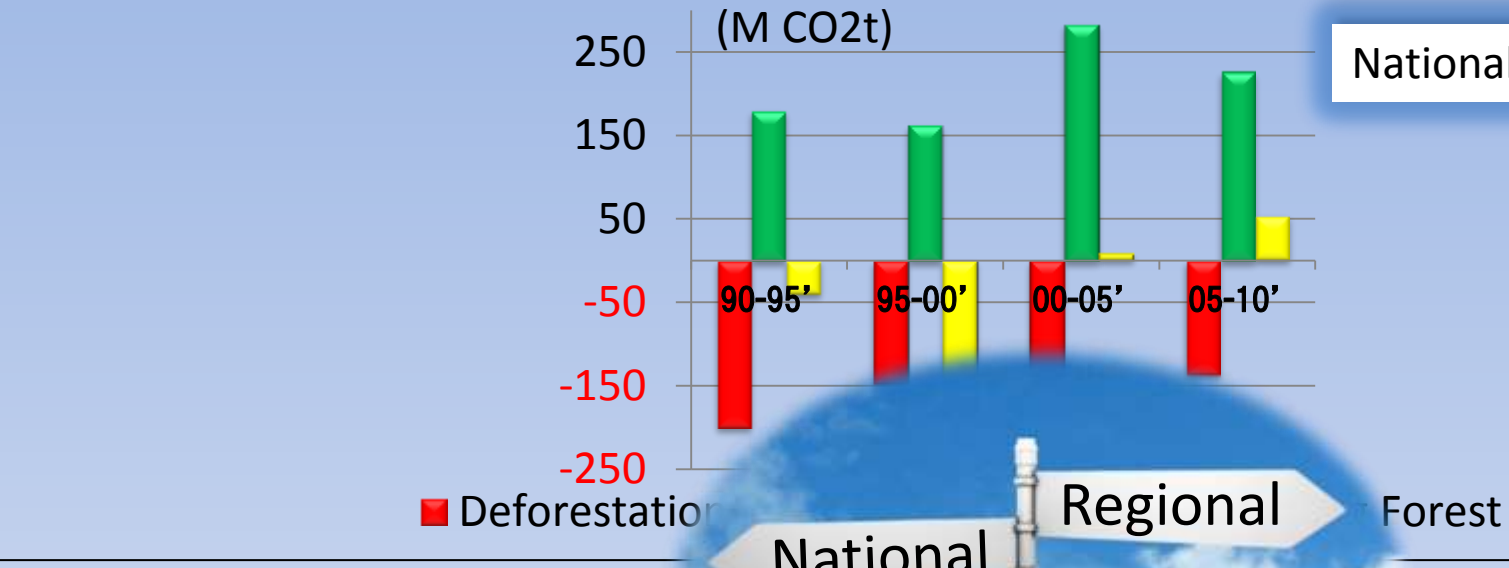


F.Type area Change 1990 to 1995 (ha)



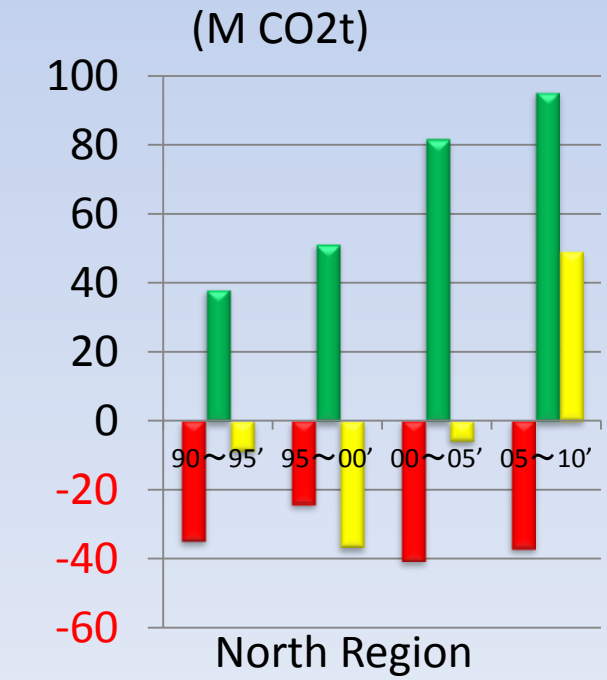
Emission Factor Change 1990 to 1995 (Ct/ha)

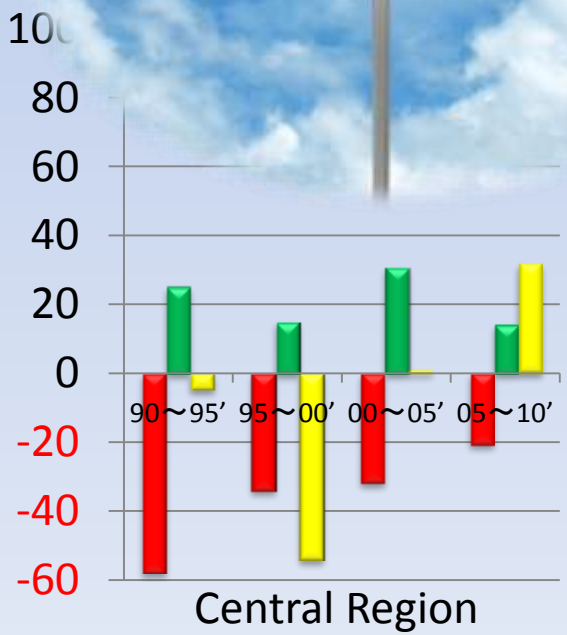


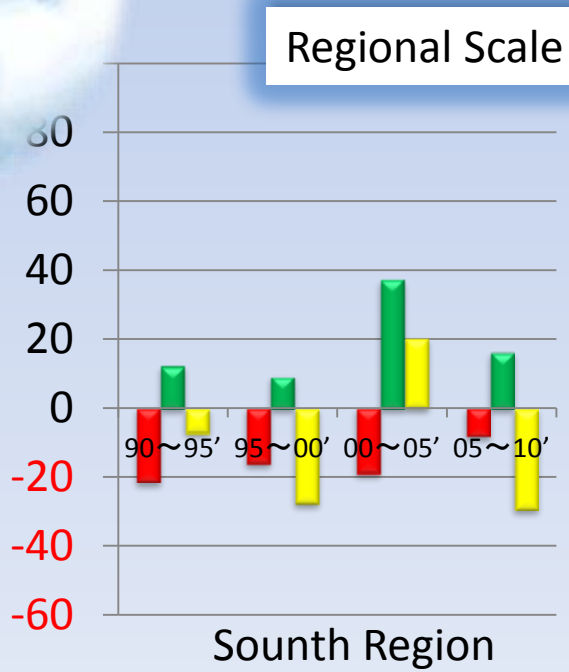
# Technical options when estimation of carbon change (Units of Aggregation)







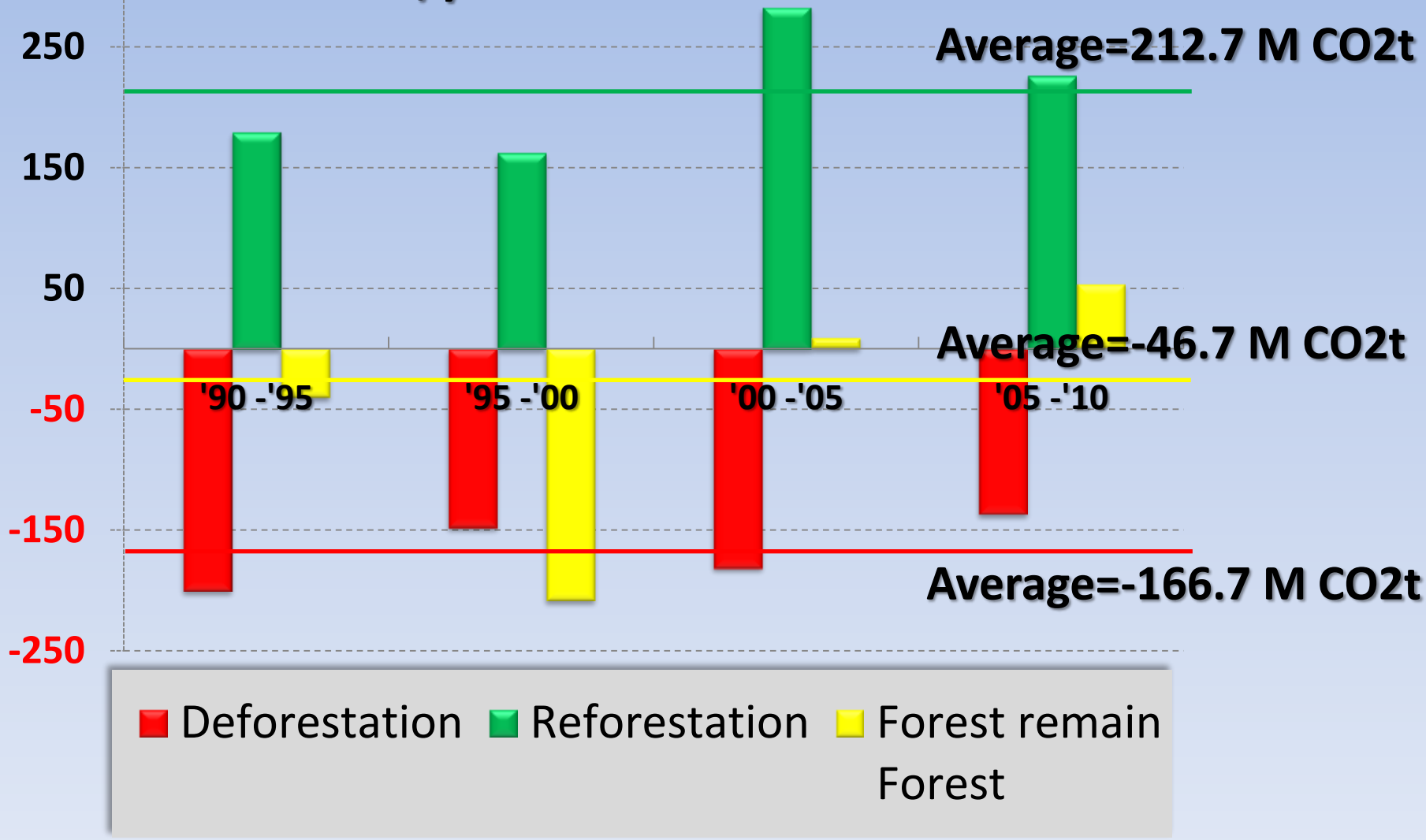




Regional Scale

# Summary of interim REL/RL based on BAU

Total=-0.62 M CO2t （From2010 to 2015）←Extrapolate by average model

⇒-0.124 M CO2t/year



# Contents of presentation

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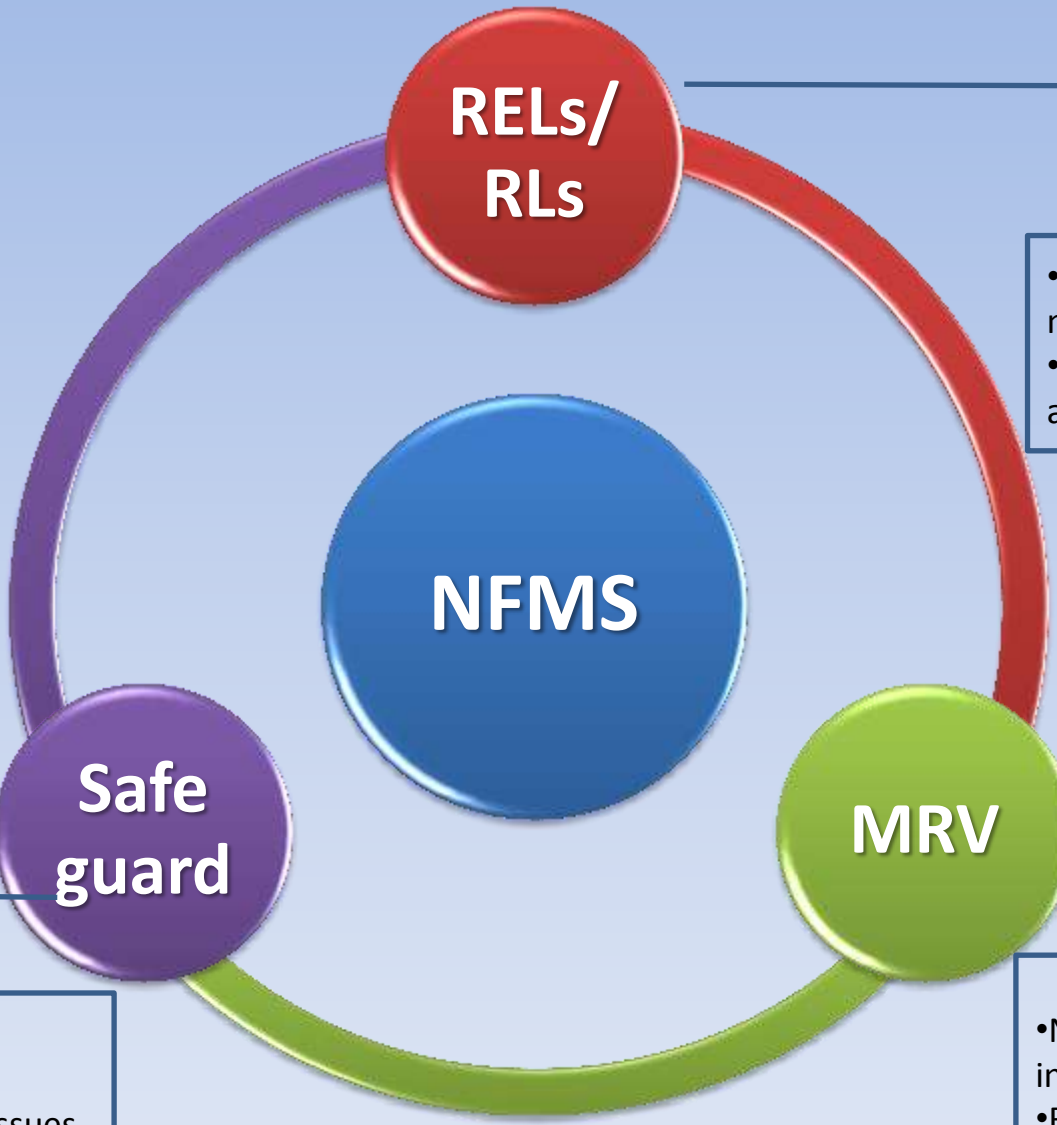
- Stepwise approach for National Forest Monitoring System development

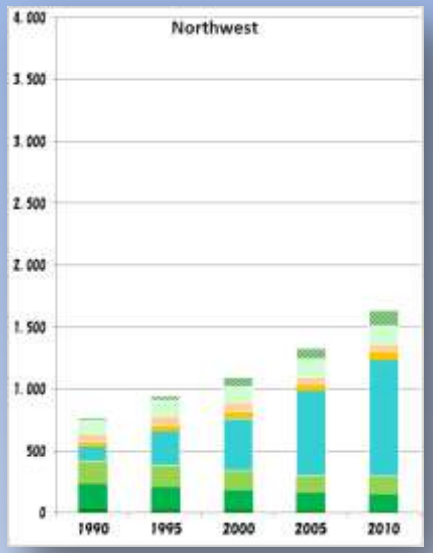
# Three Contents of REDD+

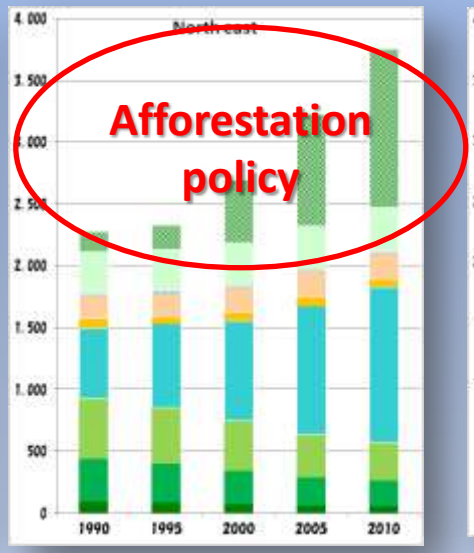



- How to taking into account national circumstances
- Separation of natural cause and antropogenetics

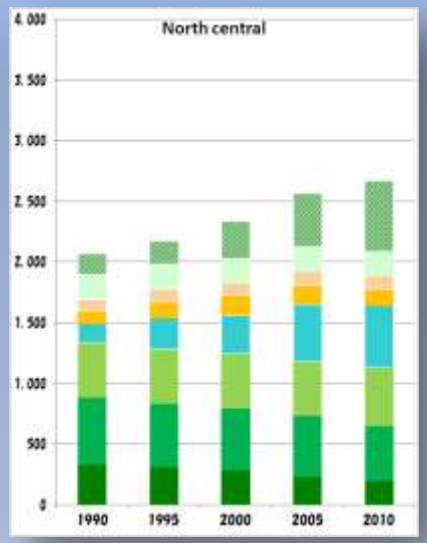
- What is Safeguard
- Criteria and Indicator
- How to address these issues
- Monitoring system

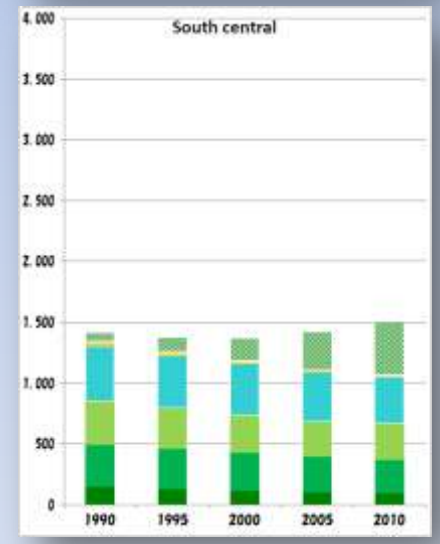
- National communication and internal monitoring system
- Benefit distribution and performance indicator



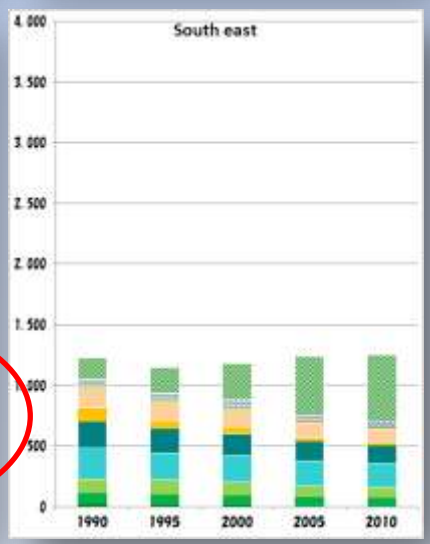









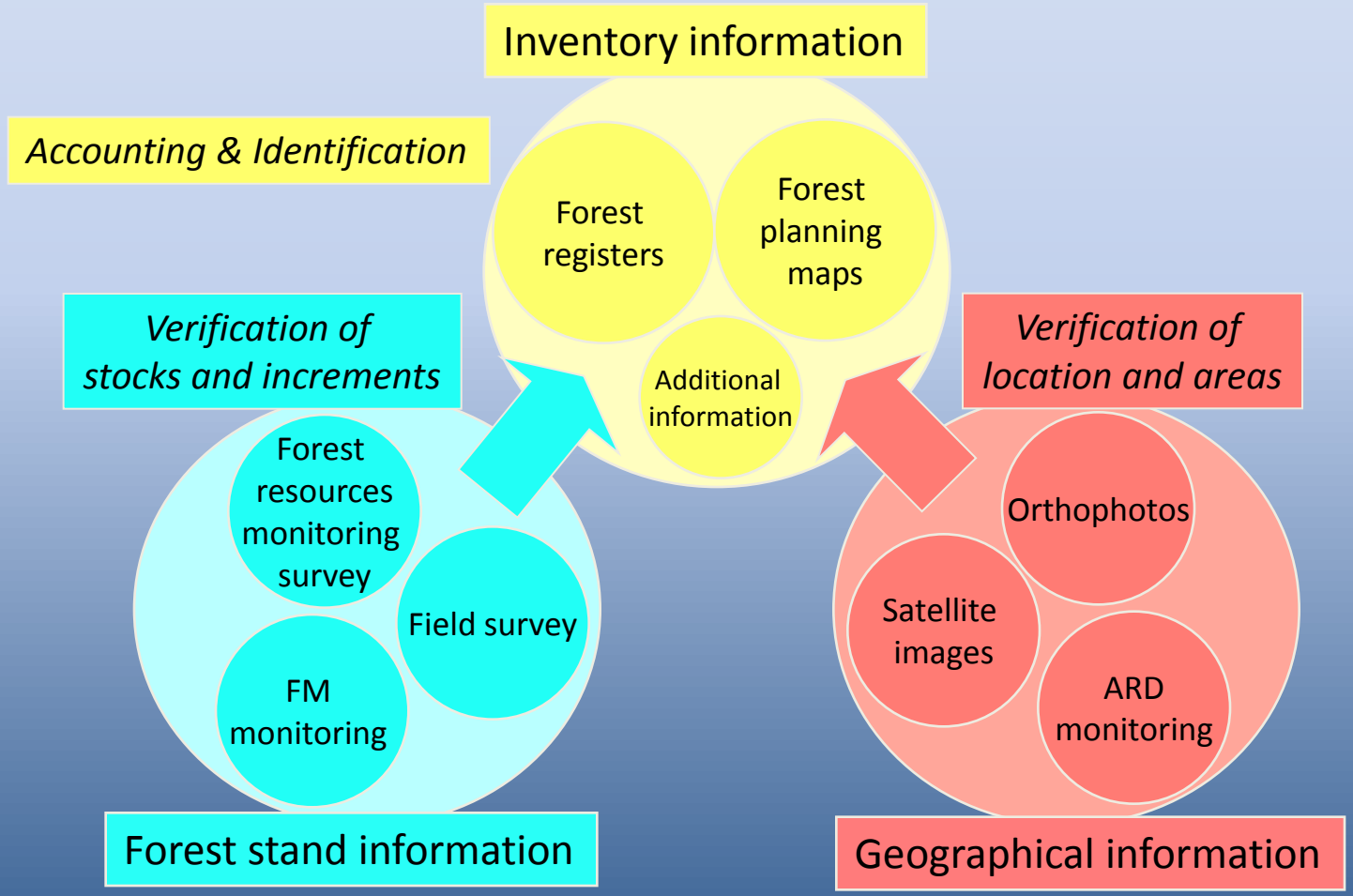




# Why we needs to collecting drivers and measures?

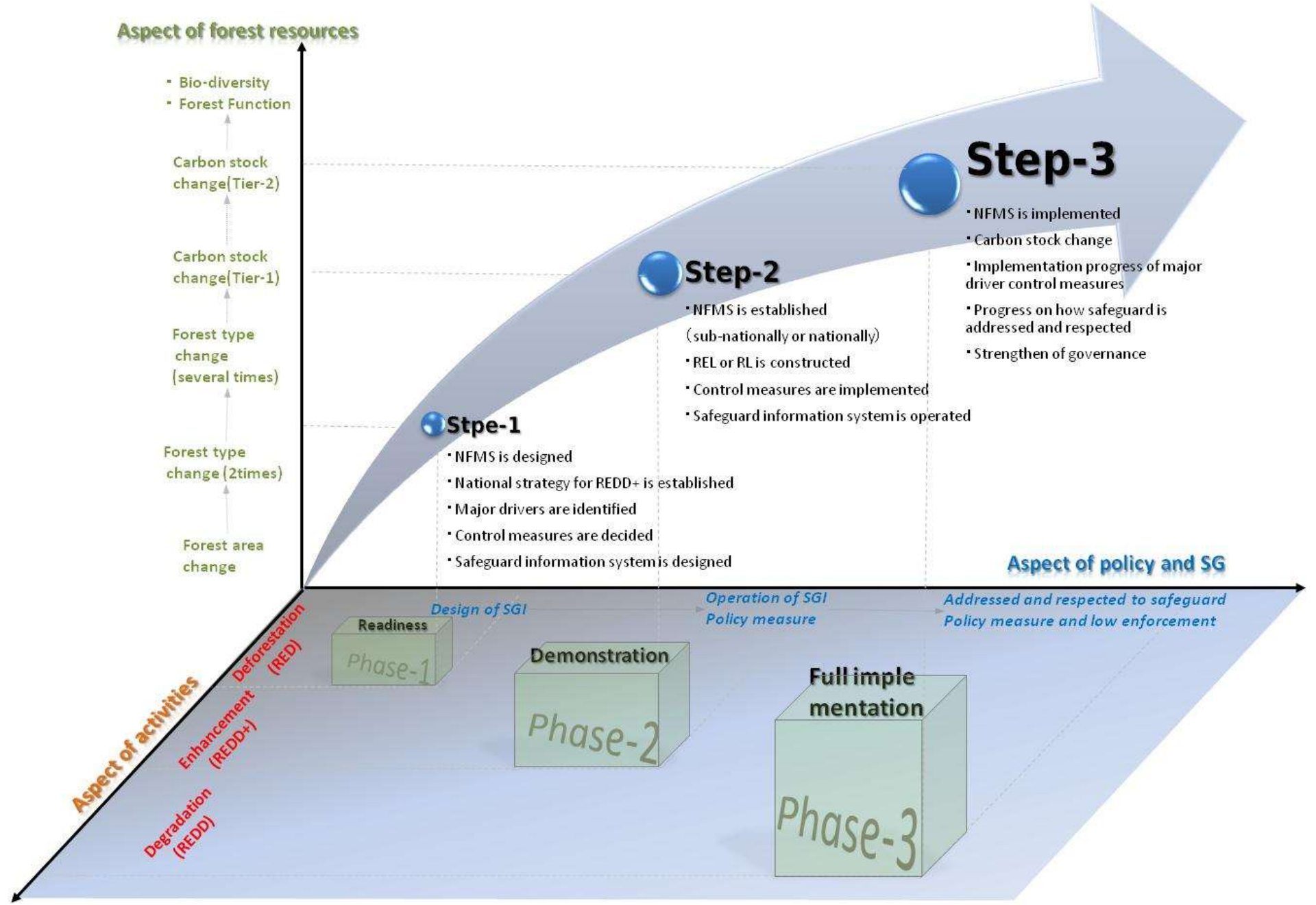
# Conceptual Design of Forest GHG Accounting and Reporting System in JAPAN

- Accounting is based on forest registers and forest planning maps mainly
- Verification with independent stand and geographical information




(Matsumoto, FFPRI)

# Stepwise approach in development of NFMS




Thank you for attention
(Nghe An Province May,2005, Nobumitsu MIYAZAKI)