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Cambodia's LULUCF inventory improvement under the APN CAPaBLE GHG Inventory Project

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Outline of Presentation

- Why improve Cambodia's LULUCF inventory

- Scope of study

- Location of Study

- Methodology

- Progress to date

- Next activities

- Conclusion/recommendation

1. Why improve Cambodia's LULUCF inventory (1)

- Emission from LULUCF contributed about 97 % of the Cambodia's 1994 National GHG Inventory
- There was no research on emission factor (aboveground biomass, biomass growth rate), therefore the IPCC emission factors were used for the preparation of Cambodia's 1994 GHG inventory.
- In 2001, a field study on aboveground biomass and biomass increment was conducted under CCEAP-phase 2. However the data from the field survey may not reflect to the overall condition of Cambodian forests, due to:
  (1) limitation of time, financial support, and expertise
  (2) limitation of number of location and sample selected

1. Why improve Cambodia's LULUCF inventory (1)

Key category analysis

A IPCC Source Category		B Direct GHGs	C 1994 Estimate	ABS	E Level Assessment	F % Contribution to Level	Cumulative
5A Changes in Forest / Woody Biomass	Forest - Deciduous	CO_2	-28,597.80	28,597.80	0.203	20.26%	20.26%
5A Changes in Forest / Woody Biomass	Forest - Evergreen	CO_2	-22,148.50	22,148.50	0.157	15.69%	35.95%
5B Forest & Grassland Conversion	Biomass-Decay- Forest - Secondary/Regrowth	CO_2	14,124.00	14,124.00	0.100	10.01%	45.96%
5A Changes in Forest / Woody Biomass	Forest - Mixed&Coniferous	CO_2	-11,757.90	11,757.90	0.083	8.33%	54.29%
5B Forest & Grassland Conversion	On-Site-Burning- Forest - Secondary/Regrowth	CO_2	10,169.28	10,169.28	0.072	7.20%	61.49%
5A Changes in Forest / Woody Biomass	Roundwood Harvested	CO_2	8,271.94	8,271.94	0.059	5.86%	67.35%
5B Forest & Grassland Conversion	Biomass-Decay- Forest - Deciduous	CO_2	4,154.33	4,154.33	0.029	2.94%	70.29%
5A Changes in Forest / Woody Biomass	Shrubland	CO_2	-3,974.67	3,974.67	0.028	2.82%	73.11%
5B Forest & Grassland Conversion	On-Site-Burning- Forest - Deciduous	CO_2	2,991.12	2,991.12	0.021	2.12%	75.23%
4A Enteric Fermentation	Non-dairy Cattle	CH_4	2,587.20	2,587.20	0.018	1.83%	77.06%
5B Forest & Grassland Conversion	Biomass-Decay- Forest - Evergreen	CO_2	2,586.38	2,586.38	0.018	1.83%	78.89%
5B Forest & Grassland Conversion	Off-Site-Burning- Forest - Secondary/Regrowth	CO_2	2,542.32	2,542.32	0.018	1.80%	80.70%
5A Changes in Forest / Woody Biomass	Forest - Secondary/Regrowth	CO_2	-2,179.10	2,179.10	0.015	1.54%	82.24%
4C Rice Cultivation	Rainfed	CH_4	2,177.07	2,177.07	0.015	1.54%	83.78%
5A Changes in Forest / Woody Biomass	Forest - Inundated	CO_2	-1,890.31	1,890.31	0.013	1.34%	85.12%
5B Forest & Grassland Conversion	On-Site-Burning- Forest - Evergreen	CO_2	1,862.19	1,862.19	0.013	1.32%	86.44%
5B Forest & Grassland Conversion	On-Site-Burning	CH_4	1,570.08	1,570.08	0.011	1.11%	87.55%
5B Forest & Grassland Conversion	Biomass-Decay- Shrubland	CO_2	1,440.40	1,440.40	0.010	1.02%	88.57%
5B Forest & Grassland Conversion	Biomass-Decay- Forest - Inundated	CO_2	1,204.50	1,204.50	0.009	0.85%	89.43%
4B Manure Management	Solid System and Drylot	N_2O	1,196.81	1,196.81	0.008	0.85%	90.27%
5B Forest & Grassland Conversion	On-Site-Burning- Shrubland	CO_2	1,037.09	1,037.09	0.007	0.73%	91.01%
4C Rice Cultivation	Irrigated	CH_4	981.29	981.29	0.007	0.70%	91.70%
4D Agricultural Soils	1 Direct Emissions	N_2O	971.12	971.12	0.007	0.69%	92.39%
5A Changes in Forest / Woody Biomass	Plantation	CO_2	-918.50	918.50	0.007	0.65%	93.04%
5B Forest & Grassland Conversion	On-Site-Burning- Forest - Inundated	CO_2	867.24	867.24	0.006	0.61%	93.66%
4D Agricultural Soils	3 Indirect Emissions	N_2O	848.05	848.05	0.006	0.60%	94.26%
4A Enteric Fermentation	Buffalo	CH_4	808.50	808.50	0.006	0.57%	94.83%
5B Forest & Grassland Conversion	Off-Site-Burning- Forest - Deciduous	CO_2	747.78	747.78	0.005	0.53%	95.36%

Tomoyuki AIZAWA, March 2004. 1st Collaborators' Meeting

2. Scope of study

• The field survey will focus on the main forest types that play important role as the key source/sink in the estimation of emission and removal in LULUCF.

• Selected Forest type to be conducted field survey:
    (a) deciduous,
    (b) evergreen, and
    (c) secondary forests.

• Data to be measured: Annual Growth Rate and aboveground biomass of the metioned forest type.

• Proposed schedule for field survey: Starting from February 2005.
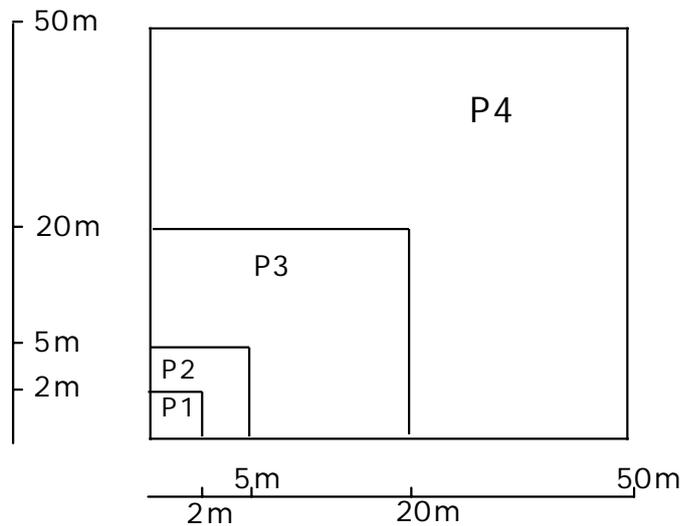
3. Location of study

4. Methodology (1)

- FAO's methodology will be adapted, but more precise as CAPaBLE Project measures biomass in necromass, understorey, and litters.

- Two permanent plots of 2,500 m^2 (50 m x 50 m) for each forest type will be established in two different provinces. All trees species with a diameter of 30 cm or greater are numbered and measured.

- Furthermore, establish three sub-plots from the same corner peg for the collection of tree information of different tree diameter classes as follows:

4. Methodology (2)

(a) Sub-plot 1: a 2x2=4m^2 plot in which count is made for all seedlings less than 5 cm in diameter.

(b) Sub-plot 2: a 5x5=25m^2 plot in which all sapling by species or species class, over 5 cm and under 7.5 cm in diameter, are numbered and measured.

(c) Sub-plot 3: 20x20 = 400m^2 plot in which all trees with a diameter of 7.5 cm or greater and less than 29.9 cm (>7.5-29.9cm) are numbered and measured for diameter with species recorded.

4. Methodology (3)

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50m ┤  ┌──────────────────────────────┐
    │  │                              │
    │  │                  P4          │
    │  │                              │
20m ┤  │  ┌──────────────┐            │
    │  │  │   P3         │            │
    │  │  │              │            │
5m  ┤  │  ┌──┐           │            │
2m  ┤  │ P2│ │           │            │
    │  │  │P1│           │            │
    │  │  └──┴───────────┴────────────┘
    └──┴──────────────────────────────
          5m        20m          50m
       2m
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5. Progress to date

- Visited Greenhouse Gas Inventory Office of Japan National Institute for Environmental Studies (NIES) in March 2004 to identify the potential improvement of emission factors reflecting country and regional conditions including actual measurements.
- Assessed key source category for Cambodian GHG Inventory
- Several discussion have been made through email to find out appropriate methodology for improving the GHG inventory in LULUCF.
- Three days field training has been organized for project team.
- Selected methodology, forest types and locations for field measurement.

6. Next Activities

- Field measurement for selected forest types and locations
- Data compiling and report writing.

7. Conclusion/recommendation

- APN CAPaBLE GHG Inventory Project will help Cambodia to improve its national GHG inventory by focusing on the key factors.
- Aboveground biomass and biomass growth rate of deciduous, evergreen, and secondary forests will be developed.
- Project team will gain experiences and skills in field measurement.

- **Some difficulties:** limited budget, expertise, equipements.

- **Our recommendation:**
  - (1) More research on Biomass After Conversion of each forest type would be done.
  - (2) Expend collaboration with other programs/projects
  - (3) APN's fund for next year activities is needed for second measurement.