附件五

林業與溫室氣體相關議題

管立豪、邱祈榮

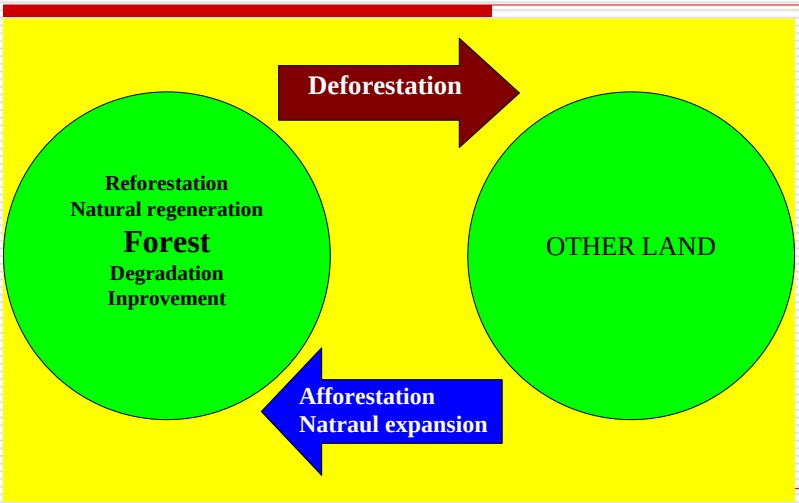
周邊會議參與議題

- Reducing emissions from deforestation in developing countries ：can it be measured?
- Community-based AR & biomass projects – report from a developers workshop
- Avoided deforestation ：poor information and data, and what to do about it
- Support successful implementation of CDM projects
- CDM forestry：climate change mitigation & adaptation benefits for poor and vulnerable communities
- Climate and forests ：the case for action now
- Measuring and monitoring reduction of GHG emissions from tropical deforestation
- Sustainable development in a carbon constrained world
- Biodiversity and a changing climate ：habitat and species loss

觀察重點議題

- Deforestation 毀林： Reducing emissions from deforestation
- 林業與CDM
- AFOLU 農林及其他土地利用 ～ LULUCF

森林改變的動態變化



森林在碳儲量改變及溫室氣體排放相關變化

- 森林生態系的自然演替
- 間接人為影響
- 永續經營施業
- 不同林型的轉變
- 非永續利用
- 土地利用的改變

森林定義

Parametres	MA[5]	CBD[6]	FAO/FRA[7]
Young stands			
Temporarily unstocked areas			
forestry land use			
Min. area (ha)	0.05-1.0	0.5	0.5
Min. height (m)	2-5	5	5
Crown cover (%)	10-30	10	10
Strip width (m)			20

Box 2: Definitions of Deforestation

毀林定義

UNFCCC 2001, adopted by COP 7 (11/CP.7):

The direct human-induced conversion of forested land to non-forested land.

FAO 2001: The conversion of forest to another land use or the long-term reduction of the tree canopy cover below the minimum 10 percent threshold.

Explanatory note:

1. Deforestation implies the long-term or permanent loss of forest cover and implies transformation into another land use. Such a loss can only be caused and maintained by a continued human-induced or natural perturbation.

2. It includes areas of forest converted to agriculture, pasture, water reservoirs and urban areas.

3. The term specifically excludes areas where the trees have been removed as a result of harvesting or logging, and where the forest is expected to regenerate naturally or with the aid of silvicultural measures. Unless logging is followed by the clearing of the remaining logged-over forest for the introduction of alternative land uses, or the maintenance of the clearings through continued disturbance, forests commonly regenerate, although often to a different, secondary condition. In areas of shifting agriculture, forest, forest fallow and agricultural lands appear in a dynamic pattern where deforestation and the return of forest occur frequently in small patches. To simplify reporting of such areas, the net change over a larger area is typically used.

4. Deforestation also includes areas where, for example, the impact of disturbance, overutilization or changing environmental conditions affects the forest to an extent that it cannot sustain a tree cover above the 10 percent threshold.

毀林定義

Parametre	M A	FAO/FRA
Transition from forest to non-forest		
Land-use change		
Crown cover change	< 10 - 30 %	< 10 %
Only directly human-induced		
Temporarily non-stocked condition does not constitute deforestation		long - term

森林退化

Forest degradation

Aware of potential difficulties, SBSTA in Decision 11/CP7 invited IPCC, inter alia, "to develop definitions for direct human-induced "degradation" of forests … and methodological options to inventory and report on emissions resulting from these activities…."

Box 3: Definitions of Forest Degradation 森林退化

FAO 2000: Forest degradation is a reduction of canopy cover or stocking within the forest.

Explanatory note: For the purpose of having a harmonized set of forets and forest change definitions, that also is measurable with conventional techniques, forest degradation is assumed to be indicated by the reduction of canopy cover and/or stocking of the forest through logging, fire, windfelling or other events, provided that the canopy cover stays above 10% (cf. definition of forest). In a more general sense, forest degradation is the long-term reduction of the overall supply of benefits from forest, which includes wood, biodiversity and other products or service.

FAO 2001, 2006: Forest degradation: Changes within the forest which negatively affect the structure or function of the stand or site, and thereby lower the capacity to supply products and/or services.

Explanatory note: Takes different forms particularly in open forest formations deriving mainly from human activities such as overgrazing, overexploitation (for fuelwood or timber), repeated fires, or due to attacks by insects, diseases, plant parasites or other natural sources such as cyclones. In most cases, degradation does not show as a decrease in the area of woody vegetation but rather as a gradual reduction of biomass, changes in species composition and soil degradation. Unsustainable logging practices can contribute to degradation if the extraction of mature trees is not accompanied with their regeneration or if the use of heavy machinery causes soil compaction or loss of productive forest area.

FAO, 2003 (core definition on common ground reached at at the Harmonizing definition meeting):Forest degradation is the long-term reduction of the overall potential supply of benefits from the forest, which includes carbon, wood, biodiversity and other goods and services.

UNEP/CBD 2001: A degraded forest is a secondary forest that has lost, through human activities, the structure, function, species composition or productivity normally associated with a natural forest type expected on that site. Hence, a degraded forest delivers a reduced supply of goods and services from the given site and maintains only limited biological diversity. Biological diversity of degraded forests include many non-tree components, which may dominate in the under-canopy vegetation.

ITTO 2002:Forest degradation: Long-term reduction of the overall potential supply of benefits from the forest, ncluding wood, biodiversity and other products or services.

ITTO 2005: Forest degradation is a direct human-induced loss of forest values (particularly carbon), likely to be characterized by a reduction of tree crown cover. Routine management from which crown cover will recover within the normal cycle of forest management operations is not included.

IPCC 2003b1 : Forest Degradation: A direct human induced loss of forest values (particularly carbon), likely to be characterized by a reduction of tree cover. Routine management from which crown cover will recover within the normal cycle of forest management operations is not included.

IPCC, 2003b:1Forest degradation: A direct human-induced activity that leads to a long-term reduction in forest carbon stocks.

IPCC, 2003 b:1Forest degradation: The overuse of poor management of forests that leads to long-term reduced biomass density (carbon stocks).

IPCC, 2003 b:1Forest degradation: A direct human-induced long-term loss (persisting for X years or more) of at least Y % of forest carbon stocks (and forest values) since time T and not qualifying as deforestation or an elected activity under Article 3.4 of the Kyoto Protocol.

Parameter	FAO 2000	FAO 2001, 2005	FAO 2003	UNEP/ CBD 2001	ITTO [12]2002	ITTO 2005	IPCC 2003b[13]	IPCC 2003b[14]	IPCC 2003b[15]	IPCC 2003b[16]
Forest type										
secondary forest										
Change within the forest										
structure										
crown cover	10%									
species composition										
stocking										
Reduction of capacity										
Productivity										
goods										
services										
carbon stocks							> y %			
other functions										
Time scale	longt		long		long		longt	long	long	long
specified duration							X years			
Cause										
human- induced										
natural										
Reference state										
natural forest										
site										
carbon stock at initial date										
Exclusion										
deforestation										
forest management under Art.3.4										

為何毀林議題需要被關注？

- 熱帶森林面積減少速度驚人
- 1980年代每年減少15.4百萬公頃
- 1990-2000年每年減少10.1百萬公頃
- 2000-2005年每年減少10.4百萬公頃

- 學者估算1990年代因毀林造成之排放量介於0.91-2.20 Gt/yr

為何毀林議題需要被關注？

- 全球土地利用的改變所造成的排放量約佔總排放量的20%以上而改變地點幾全部來自熱帶雨林的破壞
- 在非洲、巴西及印尼等地區因毀林所造成的碳排放佔該地區總排放量的70%左右
- 隨著世界人口及財富的增加，對於林產品的需求將持續成長
- 除非熱帶地區的國家被補貼以便保留該國的森林，否則持續的毀林將使全球暖化減緩的努力付之東流
- 最後終將And no forests by the end of the century.

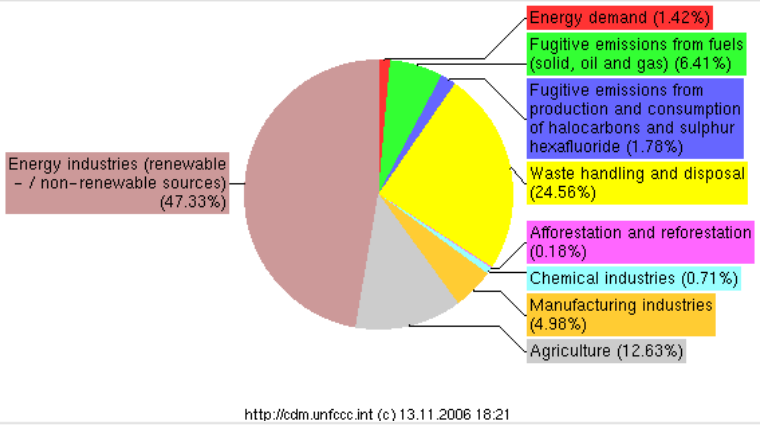
減量補償（Compensated Reduction）

- CR概念首次出現於COP9周邊會議
- IPAM巴西研究人員提出
- 2005年COP11 Papua New Guinea與Costa Rica正式提出議案
- 引發Reducing emissions from deforestation in the developing countries風潮
- 24屆SBSTA 5/18-5/26 2006 德國波昂
- Workshop on reducing emissions from developing countries 8/30-9/1 2006義大利羅馬

發展趨勢

- 毀林的嚴重情形、毀林驅動力逐漸被認可
- 漸趨於傾向同意補償，但對於基準值的認定、補償的額度、監測方法等後續配套措施仍無法取得共識，預計明年仍將有一連串的技術性磋商將進行。

林業與CDM　　526已登錄CDM



Current Eligibility in the Kyoto Protocol

- **Scope strictly limited in the CDM**
  - **Only Afforestation/Reforestation and reduction of non-CO_2 emissions from agriculture**
  - **Afforestation/Reforestation allowed to supply credits for maximum 1% of Annex I 1990 emissions**
  - **A/R only on land without forest since December 31, 1989** ➡
  - **A/R generates temporary credits (tCERs/lCERs): 5-year leases**
  - **Replacement of temporary credits after max 60 years**
  - **Cap on small-scale A/R projects at 8,000 t CO_2e/yr**

Practical Proposals (1/5)

- **Problem: Only Afforestation/Reforestation and reduction of non-CO_2 emissions from agriculture are allowed in developing countries**
- **Result: Misses major climate mitigation opportunities (reduced deforestation, revegetation, soil carbon management).**
- **Solution:**
  - **Harmonize rules for CDM and JI: expand the list of activities eligible in the CDM to include**
    - **Reduced emissions from deforestation**
    - **Revegetation (restocking forests & use of non-tree species)**
    - **Soil carbon management in agriculture**
  - **Accompanied by ratcheting up of emission caps to support CER prices**

Practical Proposals (2/5)

- **Problem: Credits from A/R projects in developing countries are allowed to supply max 1% of Annex I Countries' 1990 emissions**
- **Result: Market is not inclusive or fair: A/R and other AFOLU activities represent one direct way for rural populations to participate in the growing carbon market and contribute to sustainable development.**
- **Solution:**
  - **Lift or relax that constraint**
  - **If necessary, accompanied by ratcheting up of emission caps to support CER prices**

Practical Proposals (3/5)

- **Problem: A/R only on land without forest since December 31, 1989 (to prevent gaming: cut natural forest to "plant carbon").**
- **Result: Honest efforts to reforest areas degraded after 1989 cannot be supported. Discontinuity in the landscape makes no ecological sense.**
- **Solution:**
  - **Devise rules to allow reforestation on land deforested after 1989 subject to proof that subsequent reforestation was not the purpose.**
  - **Politically difficult, but not technically impossible**
    - **"Reverse additionality" rule: Prove that the CDM did not create an incentive to cut existing forests and then start a reforestation project in order to earn carbon credits**

Practical Proposals (4/5)

- **Problem: Replacement of temporary credits after 60 years.**
- **Result: Perverse effect: cut the forest at 60 years to be able to buy permanent credits?**
  - **This rule prevents realization of the potential 1% of 1990 emissions.** A/R represents only 1% of the market and its share is declining. 2012 potential of A/R is closer to 1/20th of the 1% potential.
- **Solutions:**
  - **Remove that rule and allow indefinite temporary crediting; or**
  - **Grandfather temporary credits and covert then to full CERs after a period of time, if necessary at a discount**

Practical Proposals (5/5)

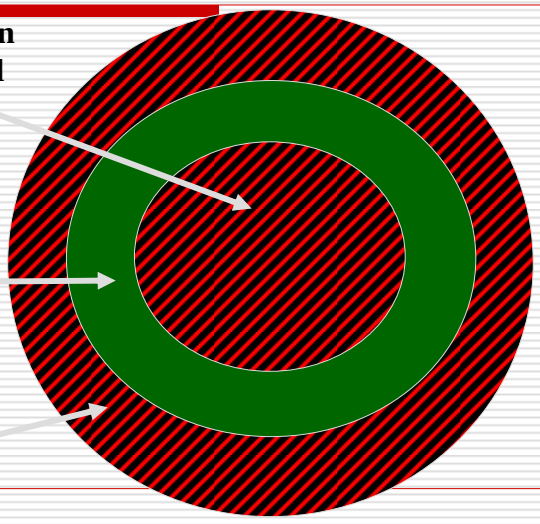
- **Problem: Small-scale A/R projects limited at 8,000 t CO_2e per year.**
- **Result: Small-scale projects are overwhelmed by transaction costs, which are more or less fixed.**
  - **8,000 t CO_2e per year ~ 40,000 t CO_2e by 2012**
  - **40,000 t CO_2e @ \$5/t CO_2e = \$200,000**
  - **Fixed costs > \$100,000 → Net revenue < \$100,000**
- **Solution:**
  - **Raise the ceiling, which was done for small-scale energy projects**

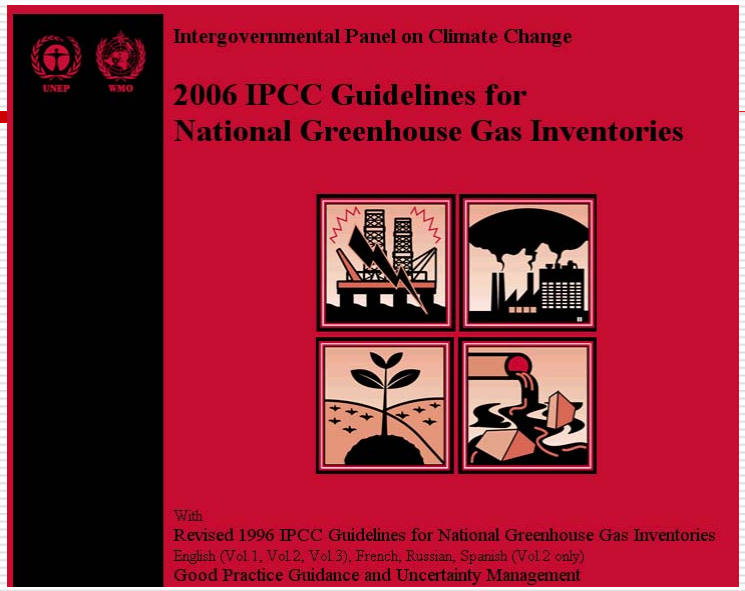
Ecological Discontinuity: Do We Want Donut Forests?

At risk of deforestation but cannot be credited

Deforested before1989: can be reforested

Deforested after 1989: cannot be reforested





Vol 4 AFOLU

- Ch4　林地
- Ch12 林產品（Harvested Wood Products）

- 計算內容與方式有所變動，將進一步比較差異性，做為日後計算的依據