

# **Carbon Forest Markets**

An Emergent Phenomenon?

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# Flashflooding Floyd

- 2 million evacuate Florida coast from fear of potential disaster.
- 200-year record floods in its wake.
- 2 million livestock die, waste ponds threaten water supply.



# Monster Mitch

- Hurricane Mitch, 1998 deadliest Atlantic storm in 200 years, caused 11,000 deaths in Central America, and more than \$5 billion in economic losses.



# Floods and Food Losses

**Bangladesh suffered a flood of the century last summer.**

**Two-thirds of nation inundated for months, 30 million left homeless, 10,000 miles of roads heavily damaged.**

**Rice harvest reduced by 2 million tons. \$3.4 billion damage.**



# Wildfires spreading

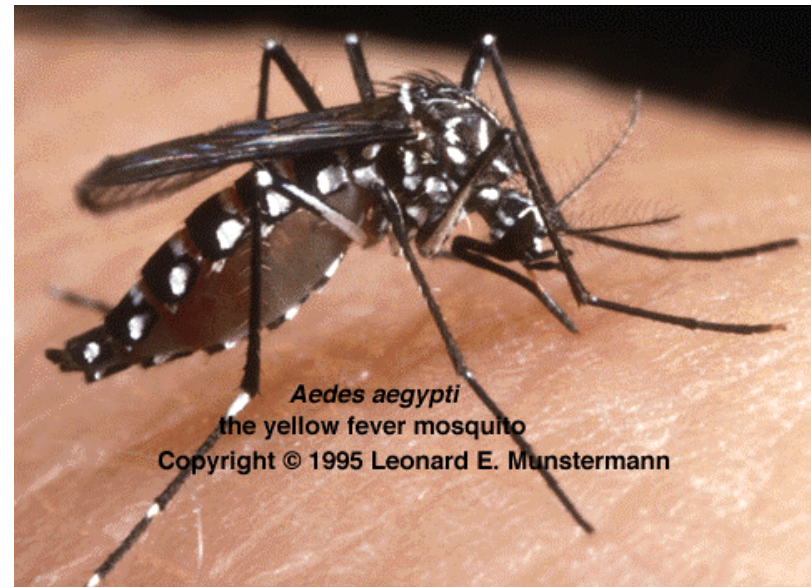
In 1996, wildfires occurred in *every* U.S. state.

More than 113,000 conflagrations burned a total of 6.4 million acres that year.



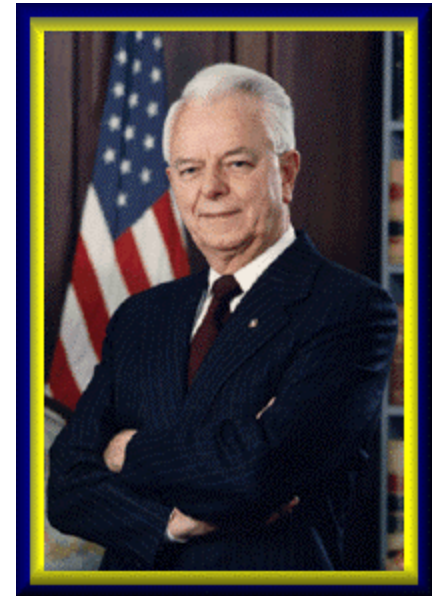
# Mosquito-spread Encephalitis

- When will the disasters change public opinion into public policies?
- Not a question of whether (perhaps weather), but when.



# U.S. Congress Fiddles

- Byrd-Hagel Amendment, the opening gambit of a stalled Kyoto Ratification.

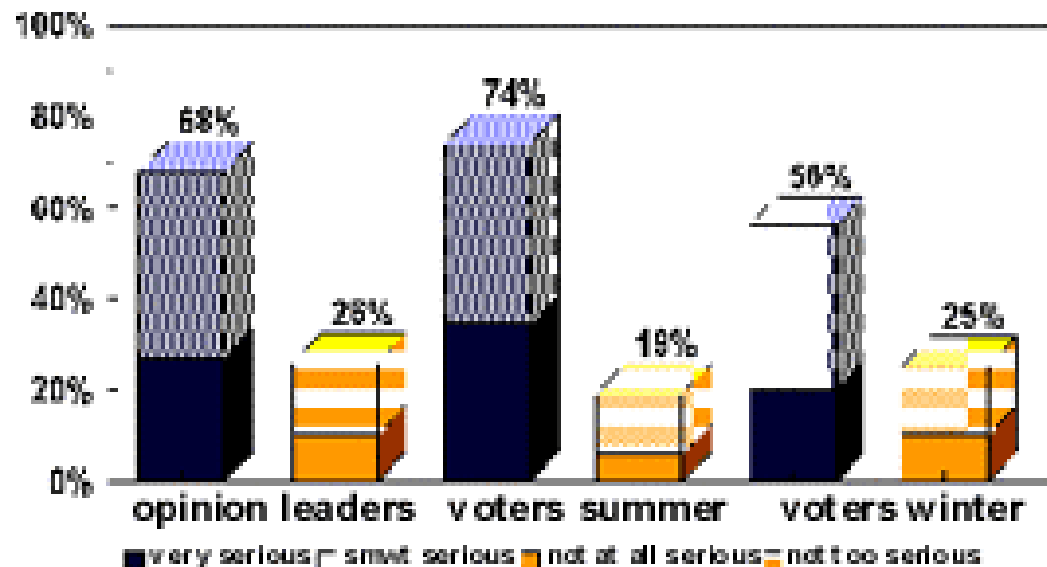


# While Folks Fume

- Public concern about Global Warming increasing.
- 2/3 to 3/4 now think serious problem.

## Opinion Leaders Believe Global Warming Represents A Serious Threat

*How serious a threat do you think global warming is today?*



summer data from EDF survey 6/98

winter data from WWF survey 2/98

# More Corporations Take Action

- *DuPont* 65% reduction, 10% renewables.  
*Shell* 47 million tons C/year by 2010 - 10% below 1990 levels.
- *BP* 22 million tons C by 2010.

A Leap Forward on Climate Change

For companies like DuPont, climate change is a business challenge.

That is why DuPont voluntarily launched an initiative to reduce greenhouse gas emissions.

The results have been dramatic. By the year 2009, DuPont will have reduced emissions from global operations by 45 percent and improved energy efficiency by 15 percent below 1990 levels. DuPont also has succeeded in holding energy use constant for the last ten years.

And DuPont is not resting on its accomplishments. DuPont just announced that it is going to take the next leap forward, setting new goals for 2010.

- Reducing global carbon-equivalent greenhouse gas emissions by 65 percent, using 1990 as a base year.
- Holding total energy use flat, using 1990 as a base year; and,
- Using renewable resources for ten percent of global energy use.

DuPont's leadership shows that it is possible to address climate change and maintain economic growth.

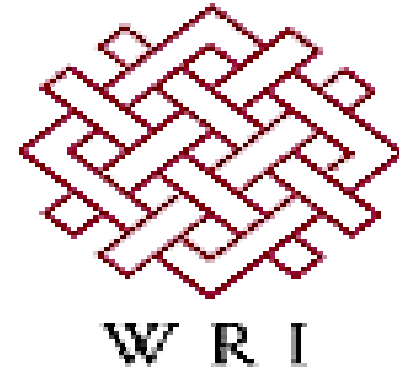
**DUPONT**

**PEW CENTER**  
ON  
**Global CLIMATE CHANGE**

DuPont is a member of the Pew Center on Global Climate Change's Business Environmental Leadership Council. The Pew Center does not receive corporate contributions.

Paid for by the Pew Center on Global Climate Change

# WRI Takes a Zero Net Carbon Pledge

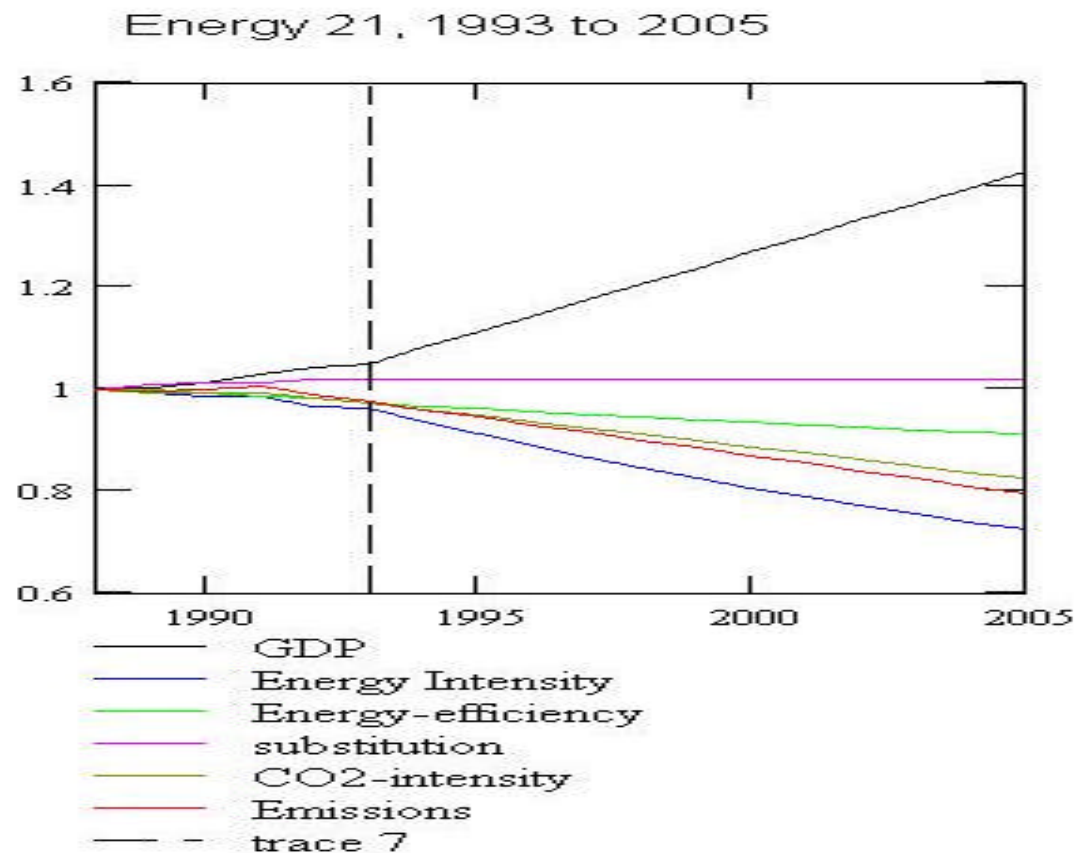


*We, the Board, management and employees of the World Resources Institute, do publicly declare our commitment to achieve zero net carbon emissions by 2005 or sooner.*

*Such an action, taken by enough institutions, companies and citizens, will avert many catastrophic losses of life and property due to the rising levels of greenhouse gas emissions.*

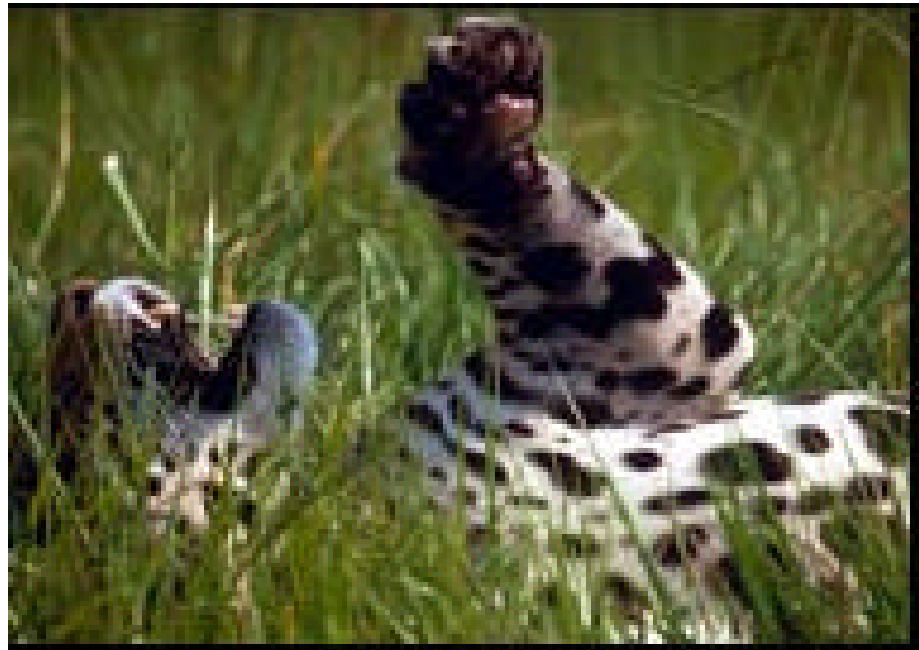
# Some Countries Implement Cap-and-Trade Systems

- Denmark - CO<sub>2</sub> 20% below 1990 by 2005
- UK



# Compounding Problems

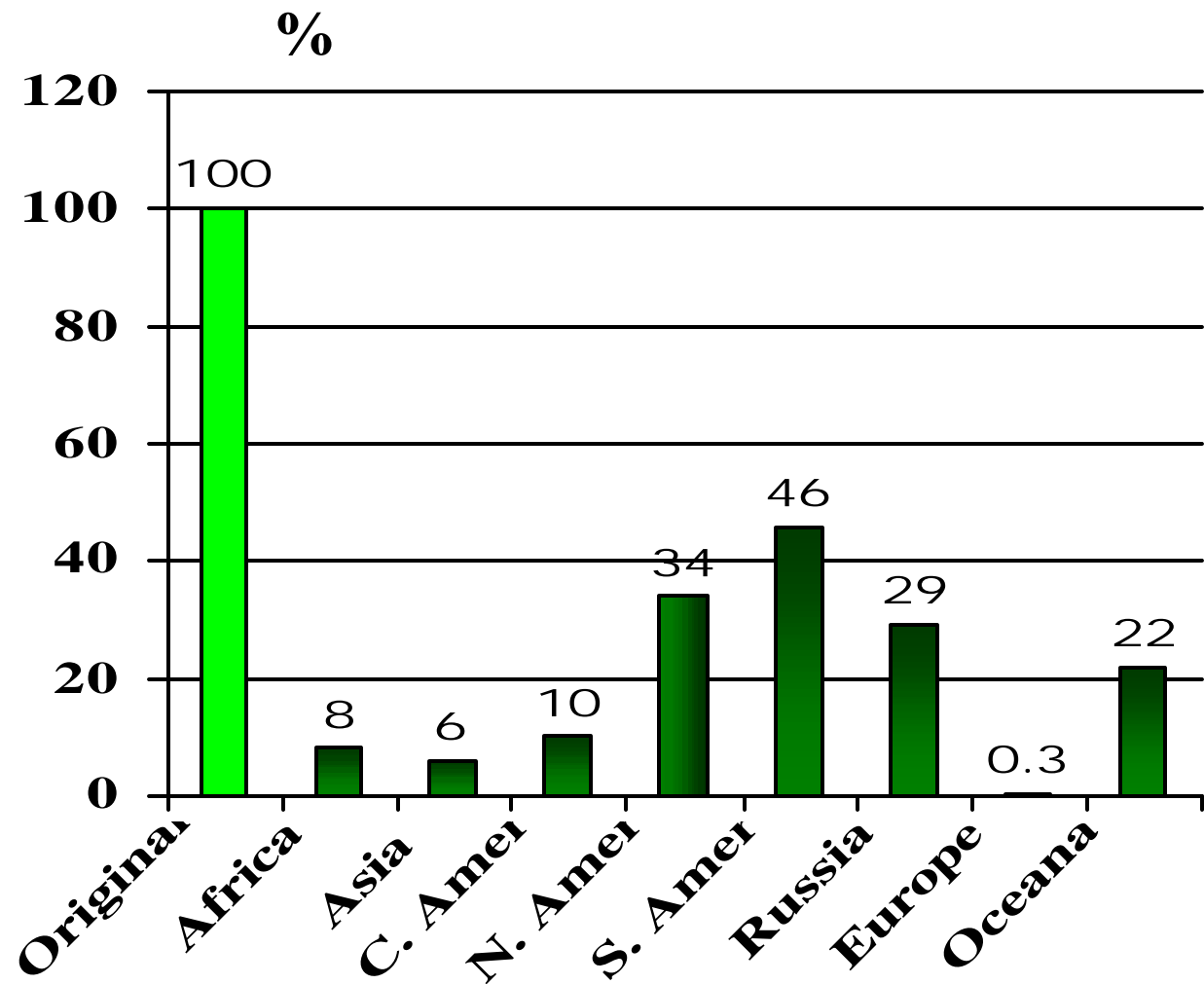
- 1/3 to 2/3 of planet's species may go extinct by middle of next century;
- Convention for Biological Diversity.



Leopard by Wayne Bennett

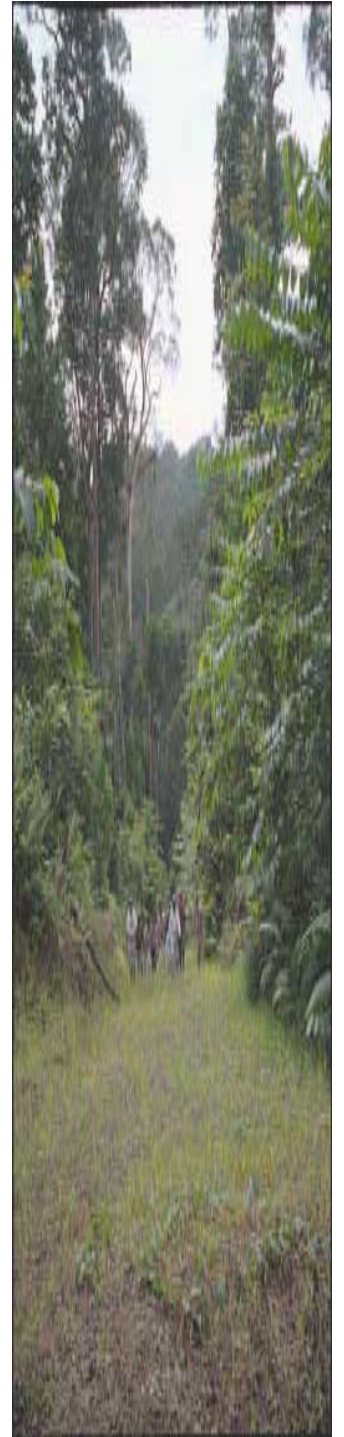
# Frontier Forest Disappearance

- Remaining Frontier Forest as % of Total Original Forest - 80% lost; half of remaining threatened



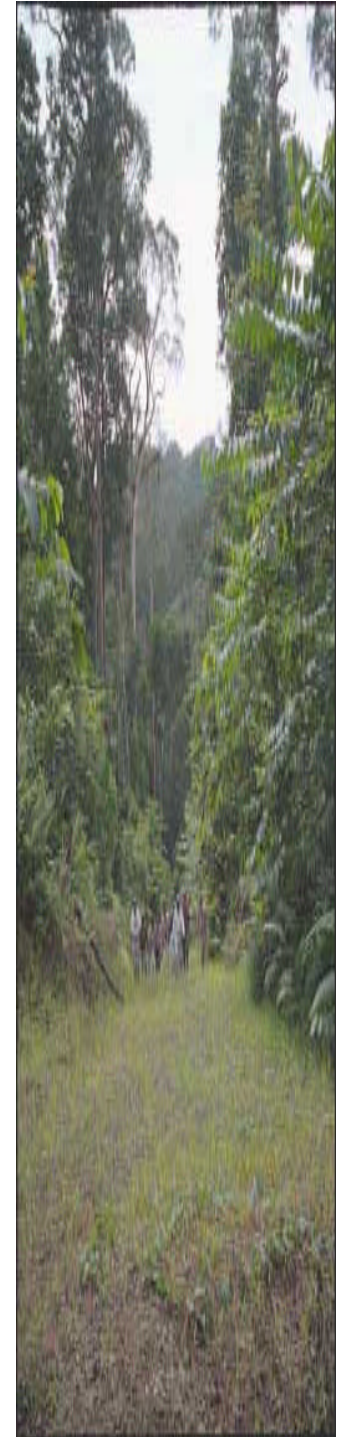
# GHG Market Potential?

- Highly speculative, but...
- \$100 million spent on offset projects over past decade.
- If an annual market clearing volume of 2 GT of CO<sub>2</sub>, and price of \$5-20/ton, annual GHG market could grow 1,000 fold from current levels.



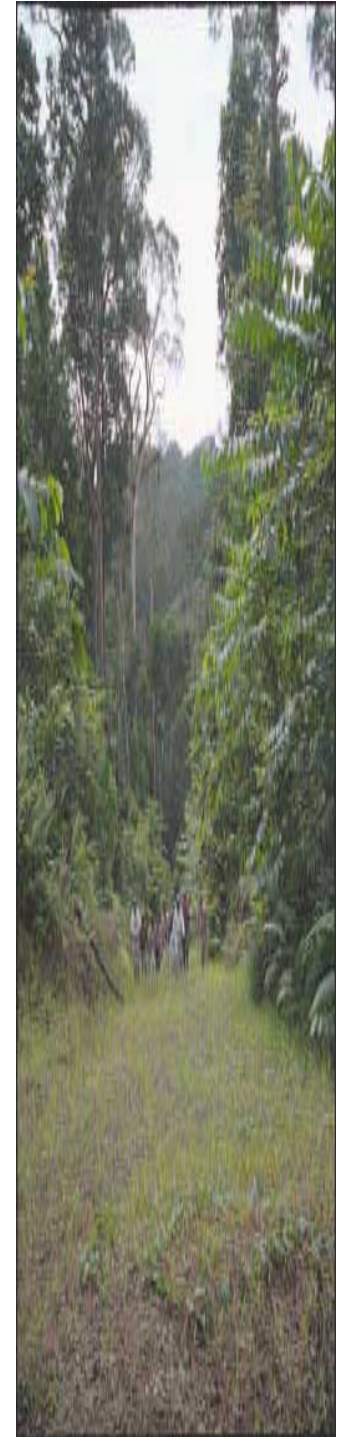
# GHG Project Experience

- Offset prices for more than 100 projects vary widely, from less than \$1 to more than \$40/ton CO<sub>2</sub> (~25¢ to \$10 t C);
- Not comparable costs (differences in methodologies and calculating costs);
- Vary widely in quality (e.g., additionality, leakage, measurement, persistence).



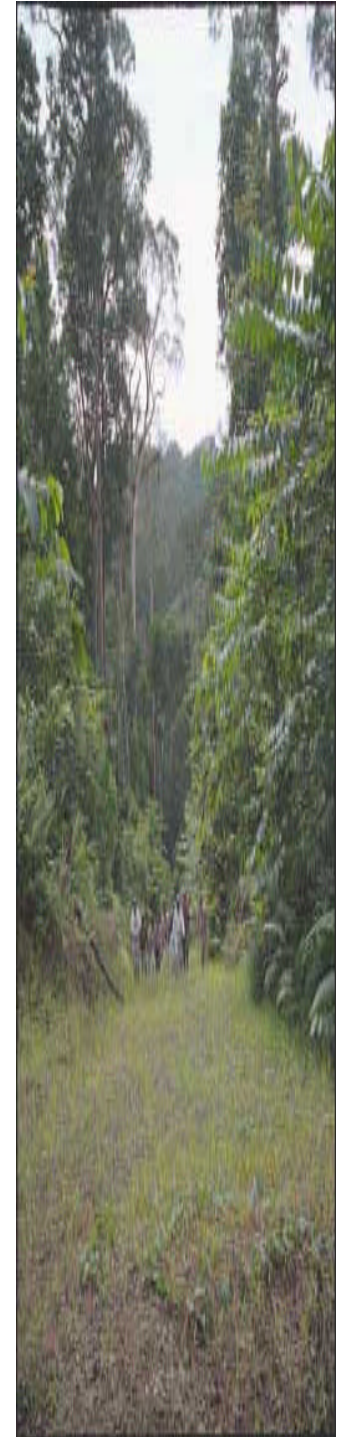
# General trends

- Market demand low;
- Trend towards smaller, higher cost projects, away from large, very low-cost ones;
- Offset prices rising over time (from AES's pennies/ton to \$1/t today);
- Clear correlation between offset quality and offset cost.



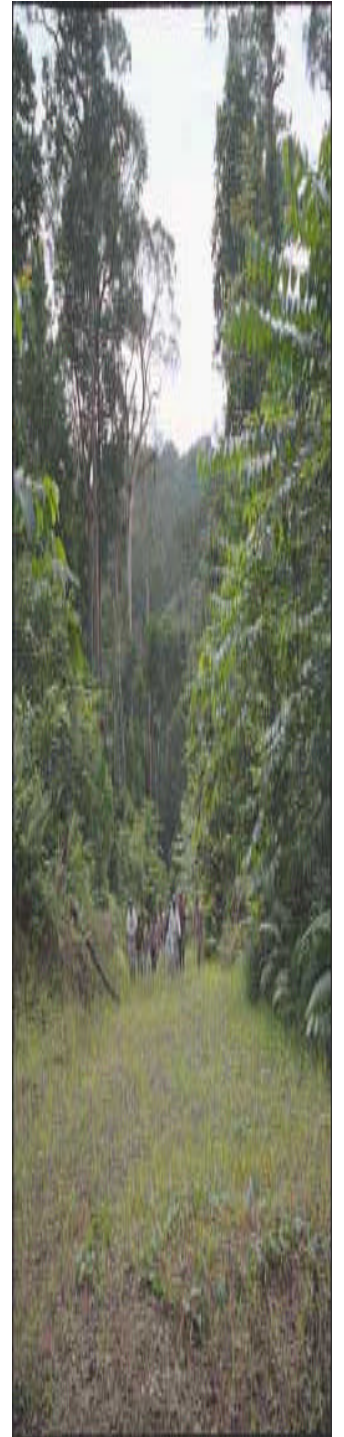
# Market Price Trends

- Universe of Offset project types will likely shrink, not expand (due to stringent, uniform standards);
- Emissions trading system will dampen price increases, but prices will still increase;
- Longer term prices should trend upward as policy steps lead to deeper reductions;



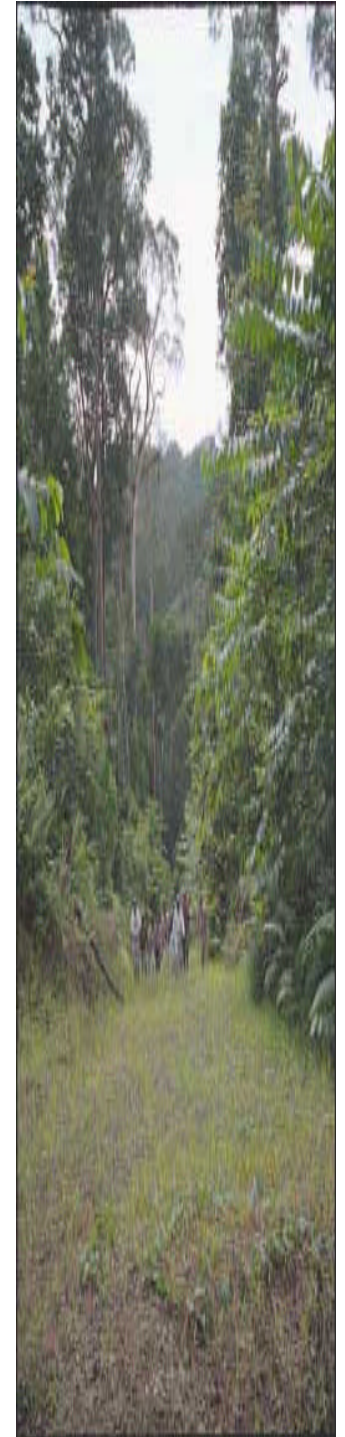
# Forest Project Experience Proves

- Can be win-win
- supported by local areas and countries;
- be comprehensively designed;
- accurately qualified;
- contribute to economic development;
- provide biodiversity and other environmental co-benefits.



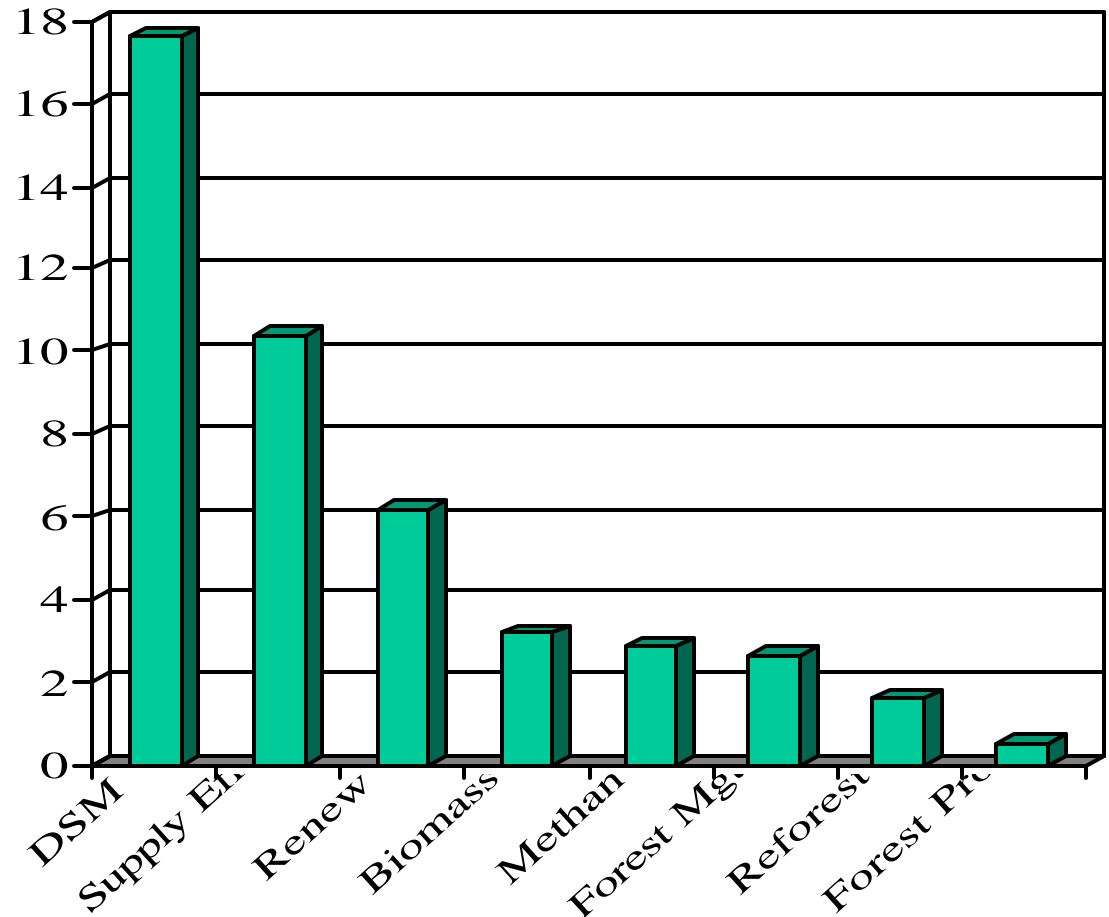
# Forests in GHG Market

- Forestry will have to compete;
- Forestry Not a homogenous sector
  - specifics of projects become key
- will need to respond to market demand
  - benefit timing, reliability
  - need to be cost-effective
    - accounting for time value of carbon
      - guarantees vs. ton-years accounting



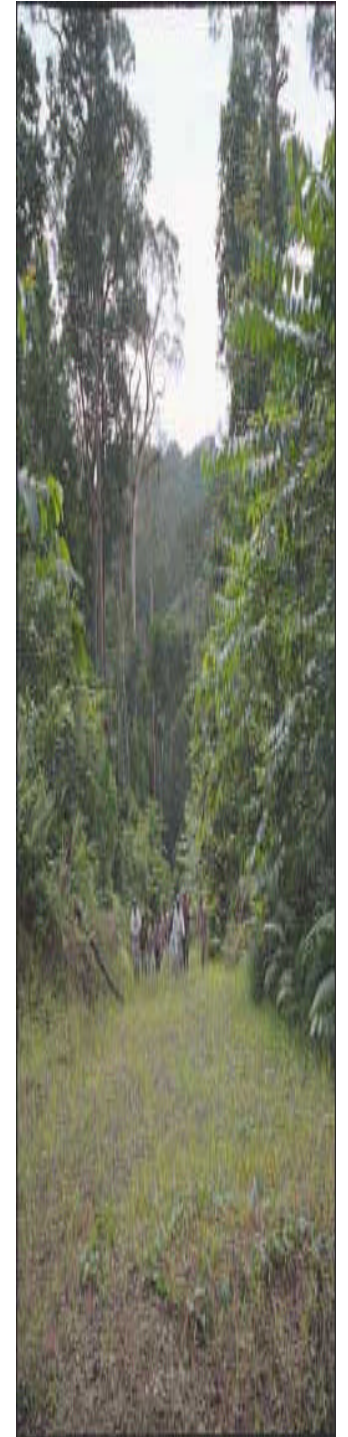
# GGOCAD Database

- 100+ projects (existing and proposed)
- avg \$7.63/tCO<sub>2</sub>
- avg forestry \$3.02/tCO<sub>2</sub>

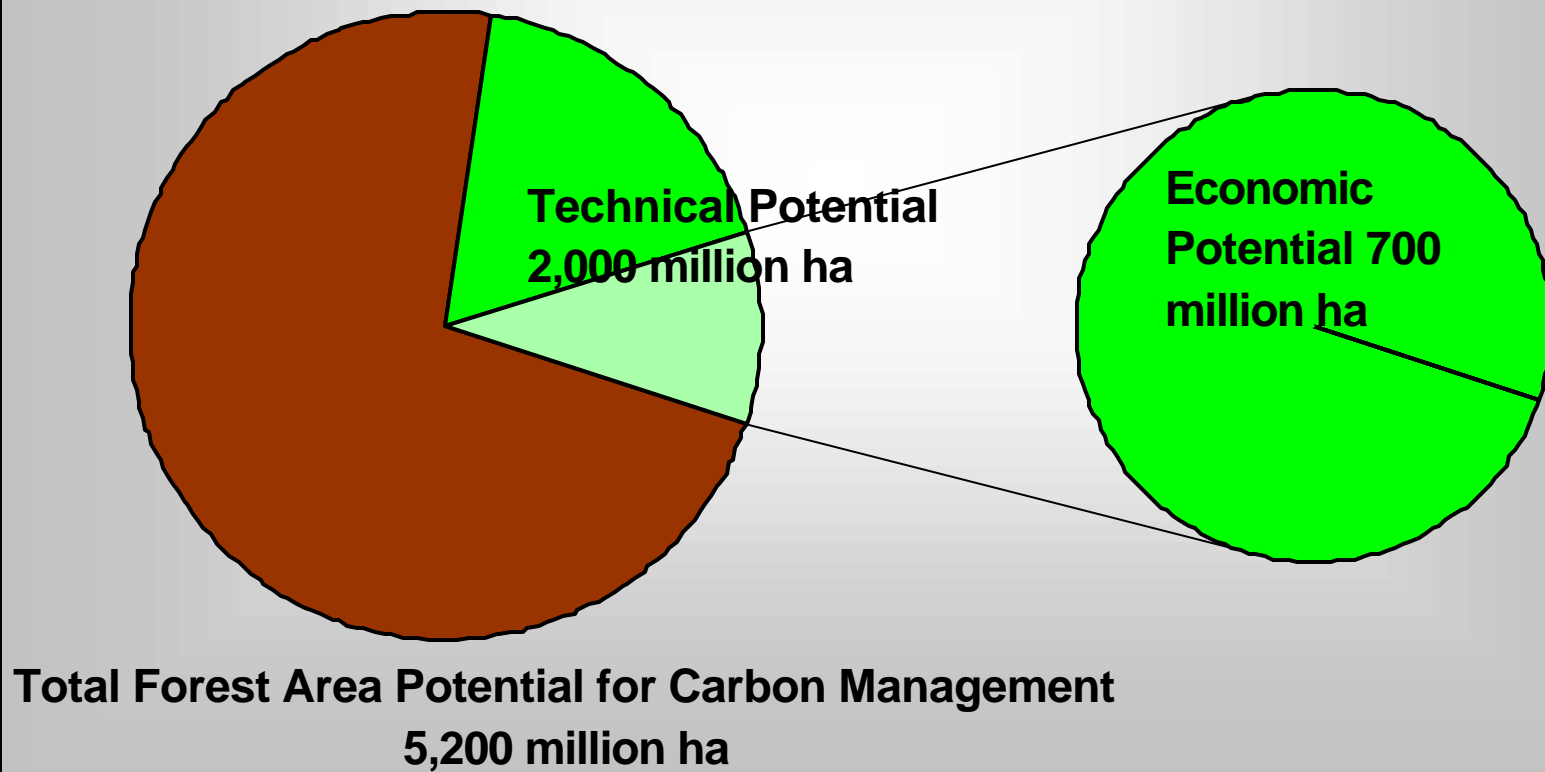


# Categories of Forestry Projects

- ♠ Preserving and protecting frontier forests
- ♠ Buying back the logging concessions in biologically rich areas
- ♠ Reduced-Impact Logging (RIL)
- ♠ Sustainable Forest Management (SFM)
- ♠ Managing wildfire threats
- ♠ Bringing degraded lands into production
- ♠ Afforestation on pasture and marginal agriculture lands
- ♠ Agroforestry on farms
- ♠ Use of biomass to displace fossil fuels
- ♠ Urban forestry

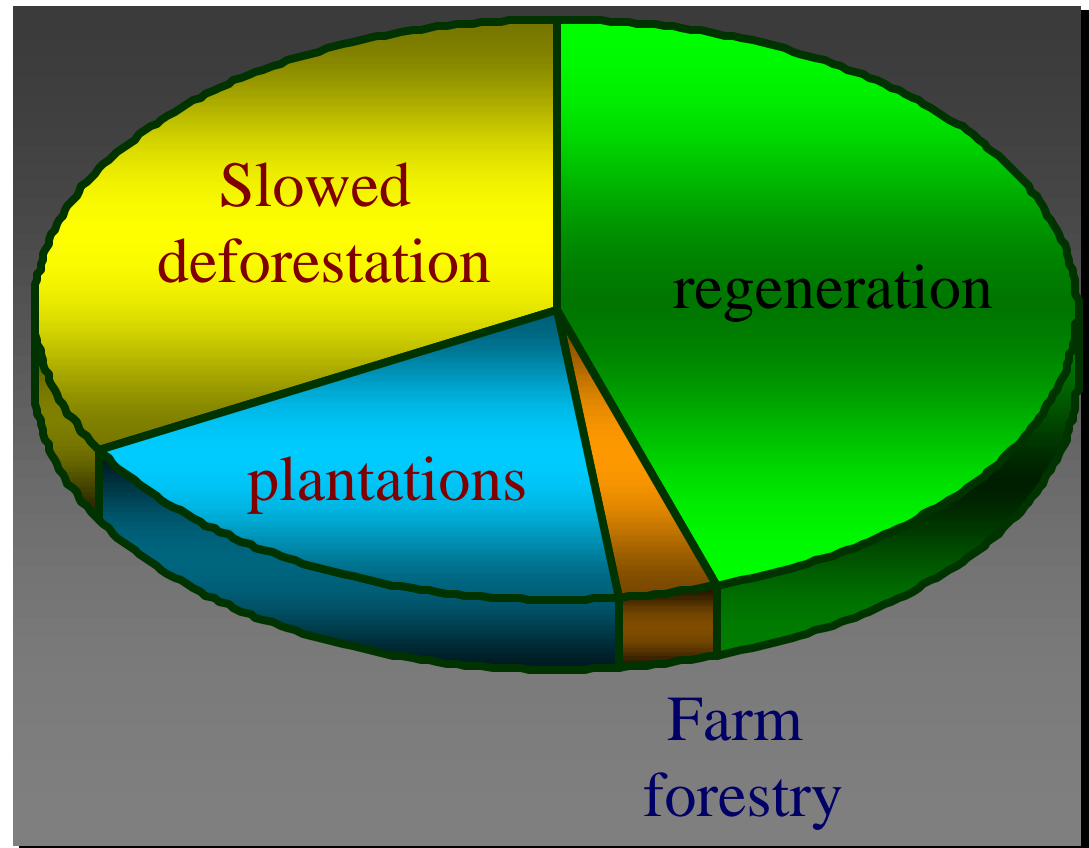


**Global Total, Technical & Economic Potential  
Forest Area for carbon management  
(million hectares)**



# Restoration Value - Climate

- Climate-friendly
- Opportunity to store 55 billion tons of carbon in tropical forests by 2050

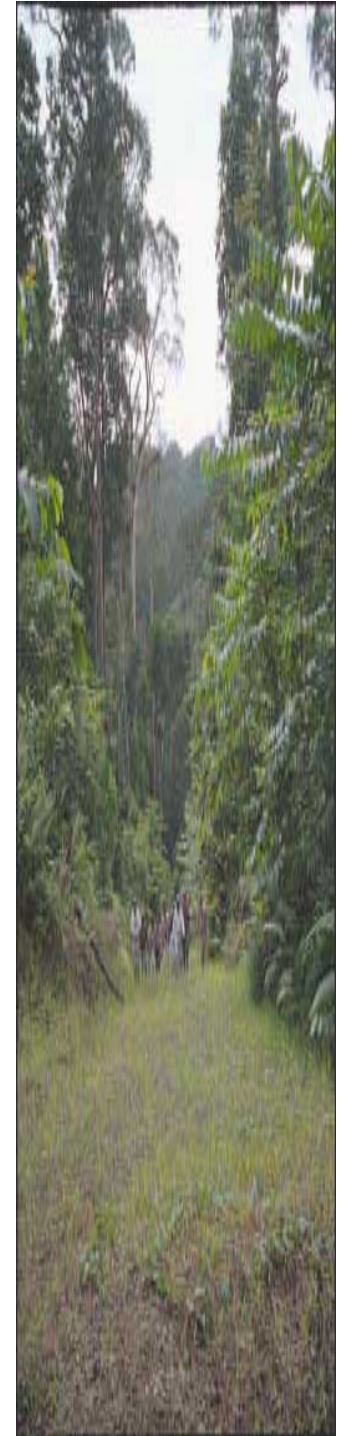


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## 20 Most Significant Tropical Countries for Carbon Retention/Sequestration

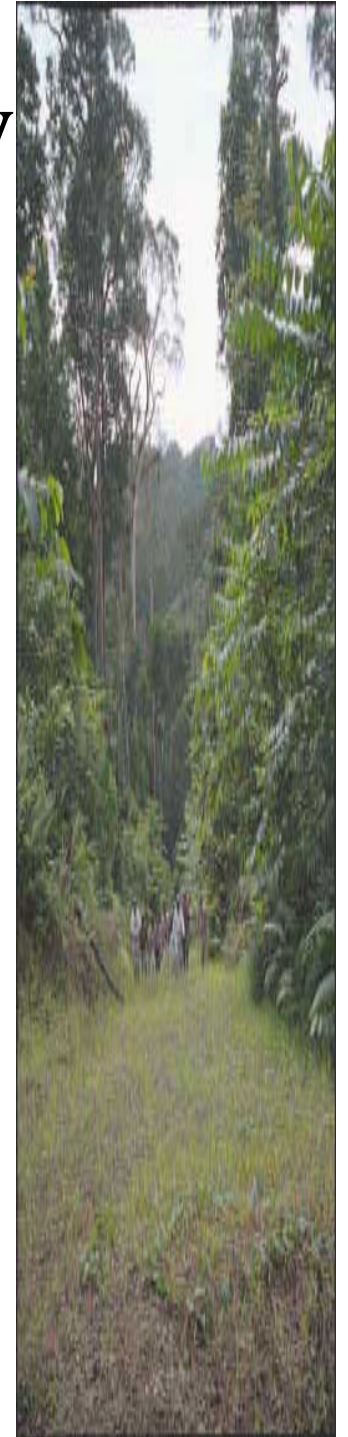
Million Tons of Carbon Stored Through  
New Growth + Slowed Deforestation 1990-2050

Rank	Country	Low C estimate	High C estimate
1	Brazil	5,400	14,000
2	Indonesia	5,400	14,000
3	Zaire	1,700	2,500
4	India	880	1,900
5	Malaysia	1,000	1,900
6	Mexico	460	1,700
7	Philippines	840	1,600
8	Colombia	630	1,300
9	Vietnam	620	1,300
10	Papua New Guinea	630	1,200



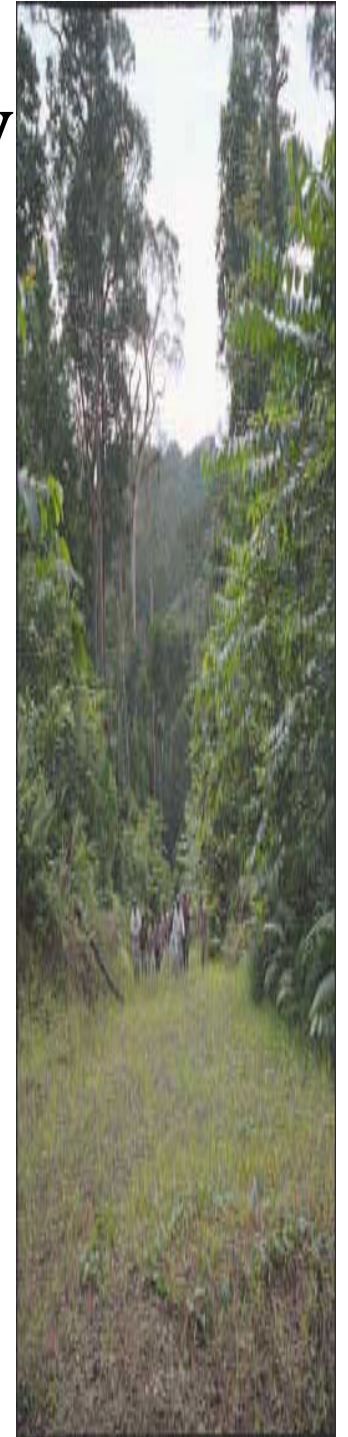
# Costa Rica's Carbon Commodity

- Govt funds for reforestation and forest protection on private lands through sale of carbon certificates to industrialized countries (Norway bought at \$10/t C).



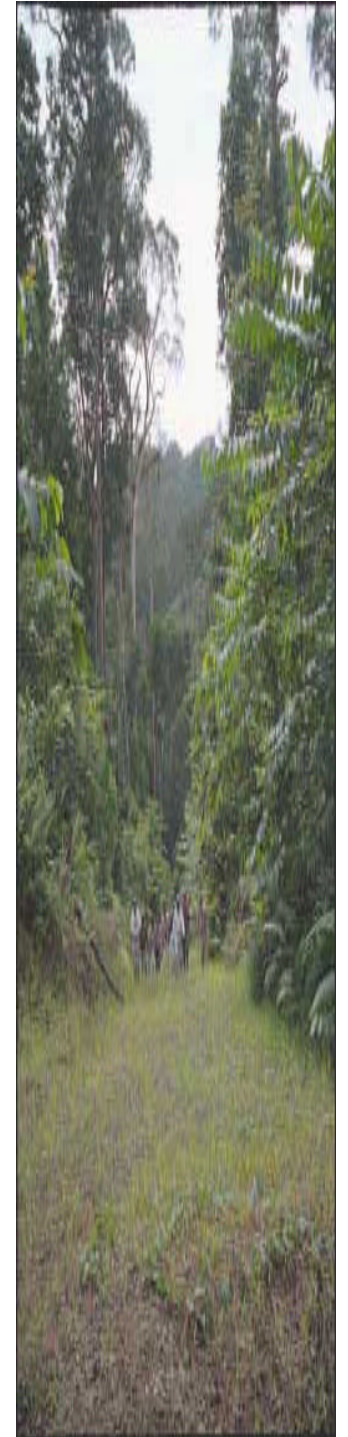
# Costa Rica's Carbon Commodity

- Financed by 5% gas tax (\$16 million/yr) & sell of CTO, govt pays private landowners to grow “commodity” through forest mgnt, plantations, selective harvesting, and buys private lands for park protected areas.



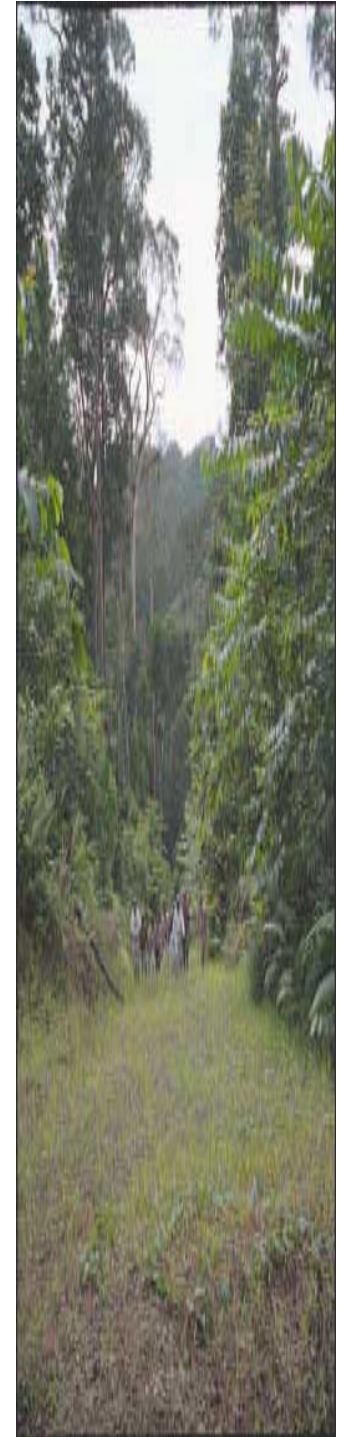
# Costa Rica's C Commodity...

- Private Forestry Projects - landowners receive \$120/ha/yr for plantations (not forested since '92), \$60/ha/yr forest protection, \$45/ha/yr forest mgnt and reforestation. Total of 0.6 to 1 MT C savings.
- Commodity orientation moves away from host-sponsor relationship.



# Costa Rica's C Commodity...

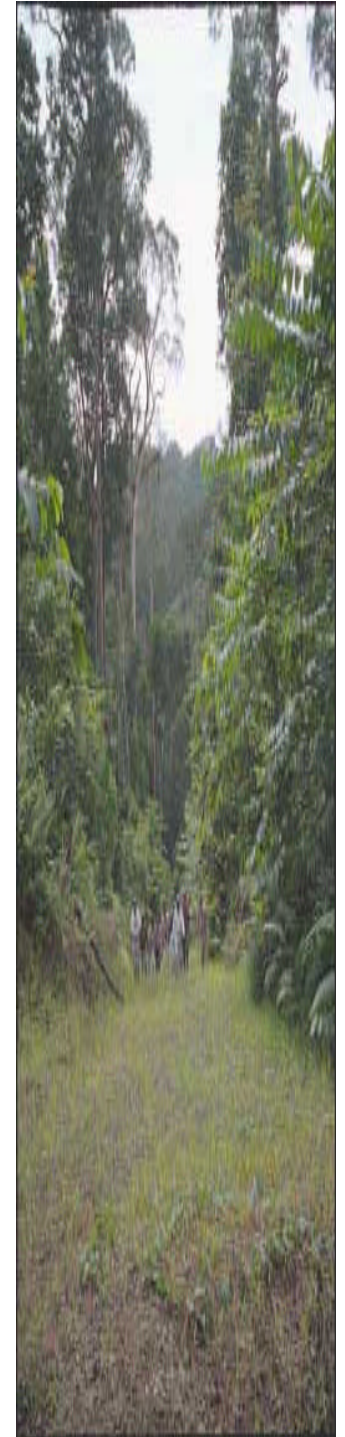
- Norway's \$2 million CTO purchase
- 7% plantations
- 83% in protection
- 10% in mangement
- 400 landowners
- 231,000 t C
- ~3 t C/ha per year uptake



# New South Wales

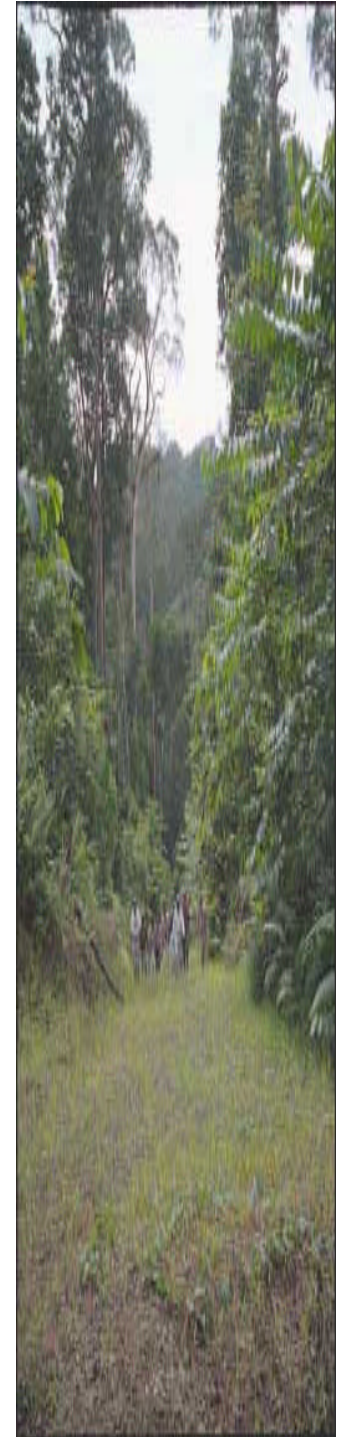
## Forest carbon rights & trading

- Legislation allows registration of a carbon sequestration right separate to the forestry right and the ownership of the land;
- to date, only using Kyoto Protocol Article 3.3 as guidance, i.e. only reforestation of previously cleared land since 1990 counts;
- stock change accounting, i.e., any harvest is treated as immediate emission



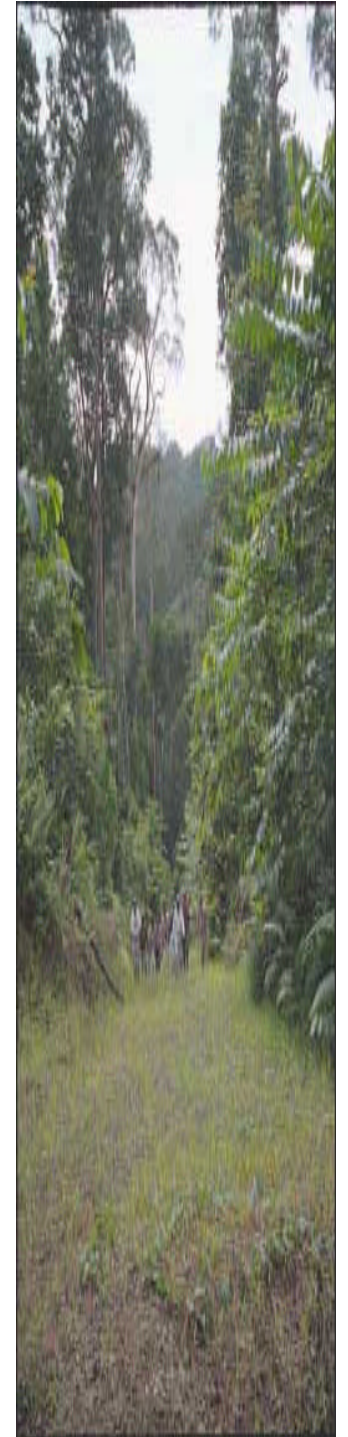
# Belize's Rio Bravo

- 1995, a consortium including The Nature Conservancy, Wisconsin Electric Power Company, Detroit Edison Company, Cinergy Corporation, PacifiCorp, Suncor and Utilitree raised \$5.7 million to add 13,200 hectares to the, now, 104,000 hectare Rio Bravo area.



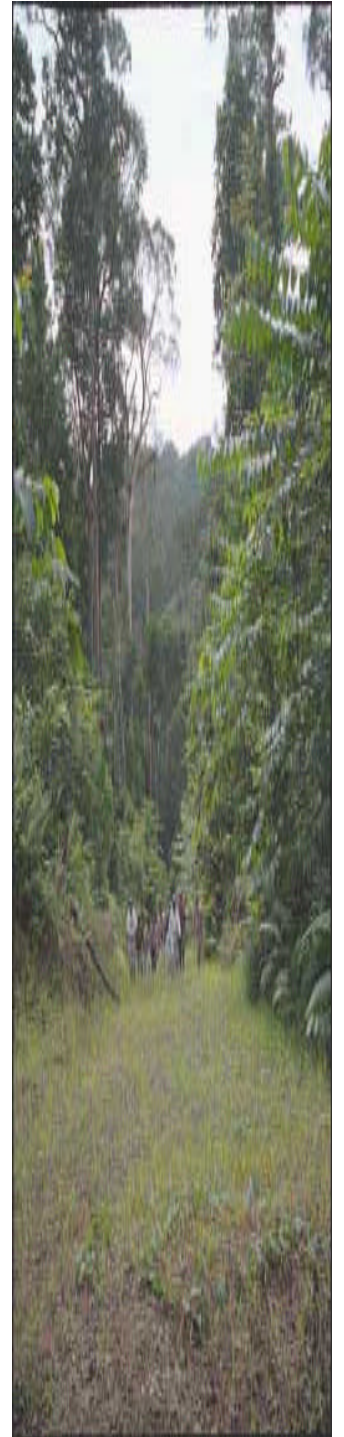
# Belize's Rio Bravo...

- Without the carbon project, more than 5,000 hectares of forest lands adjacent to Rio Bravo were endangered of being converted to farmland. More than 1.6 million tons of carbon will be sequestered at a cost of \$3 per ton.



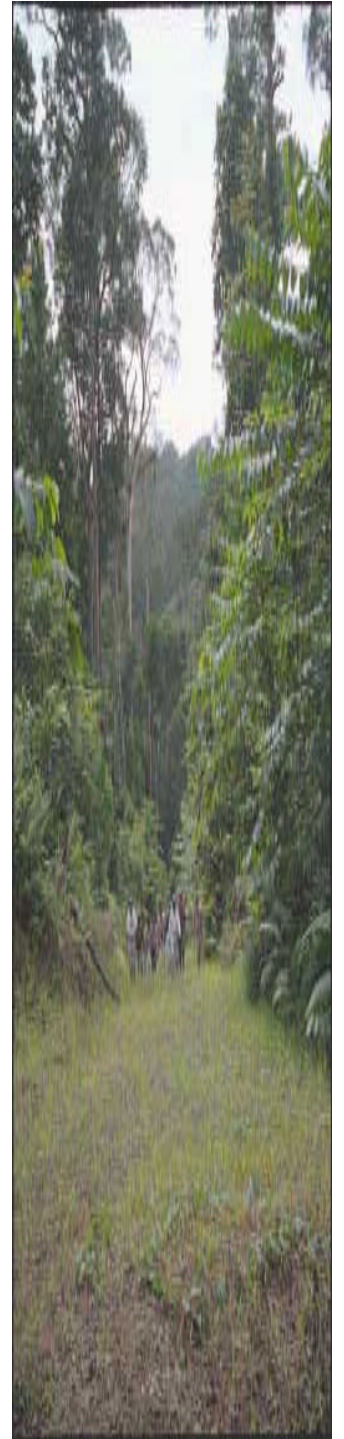
# Buying back logging rights in biologically rich areas - Bolivia

- Noel Kempff Mercado National Park in Bolivia. With the leadership of American Electric Power (AEP), PacifiCorp and BP America, in collaboration with The Nature Conservancy.



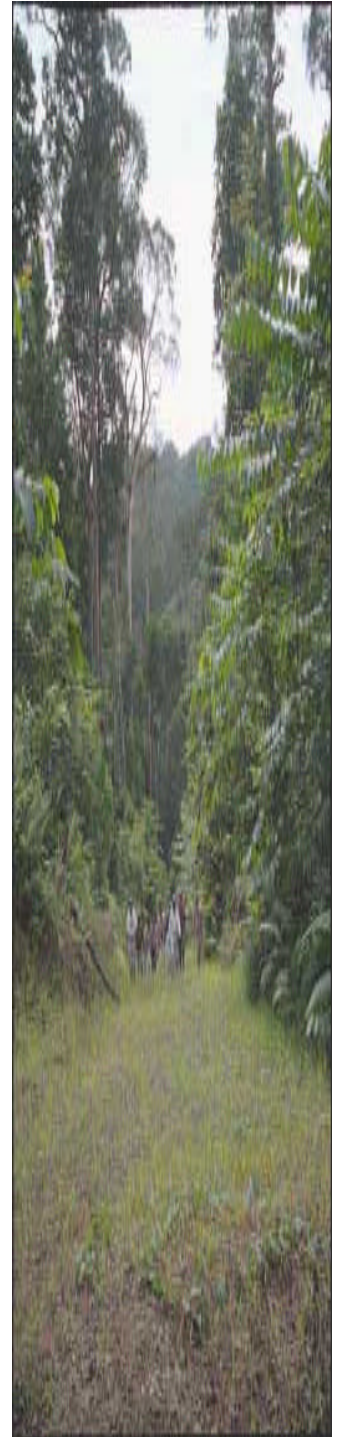
# Buying back logging rights in biologically rich areas - Bolivia

- The consortia invested \$9.5 million to pay forest companies to permanently retire the logging rights to 640,000 hectares.



# Bolivia...

- The investment more than doubled the size of the now 1.5 million hectare park.
- The land is being allowed to naturally regenerate, increasing stored carbon as it reforests.
- The cost of abatement was just \$0.63 cents per ton of carbon.



# Reduced-Impact Logging - Sabah

- Shifting to Reduced-Impact Logging (RIL) practices can reduce logging damage by as much as 50% through pre-cutting vines, directional felling, and planned extraction of timber on properly constructed and utilized skid trails.



# Reduced-Impact Logging (RIL)...

- The NEES project with Innoprise managed to reduce logging damage by 50 percent, resulting in roughly 40 tons of carbon savings per hectare (58,000 tons over the 1400 ha area) at a cost of \$7.60 per ton of carbon saved.



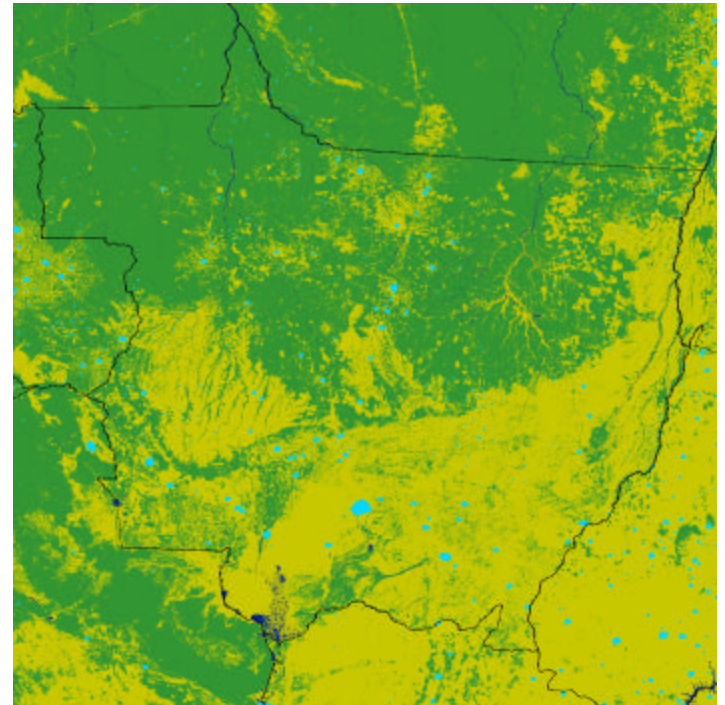
# Bringing degraded lands into production - Brazil

- In late 1998, Peugeot announced investment of \$10.8 million to create a carbon sink by planting 10 million trees on 12,000 hectares in Juruena, in the state of Mato Grosso, Brazil.



# Bringing degraded lands into production - Brazil...

- The primary objective is to create a carbon storage capacity by re-creating a tropical forest ecosystem that matches the old-growth forest's biodiversity as closely as possible.

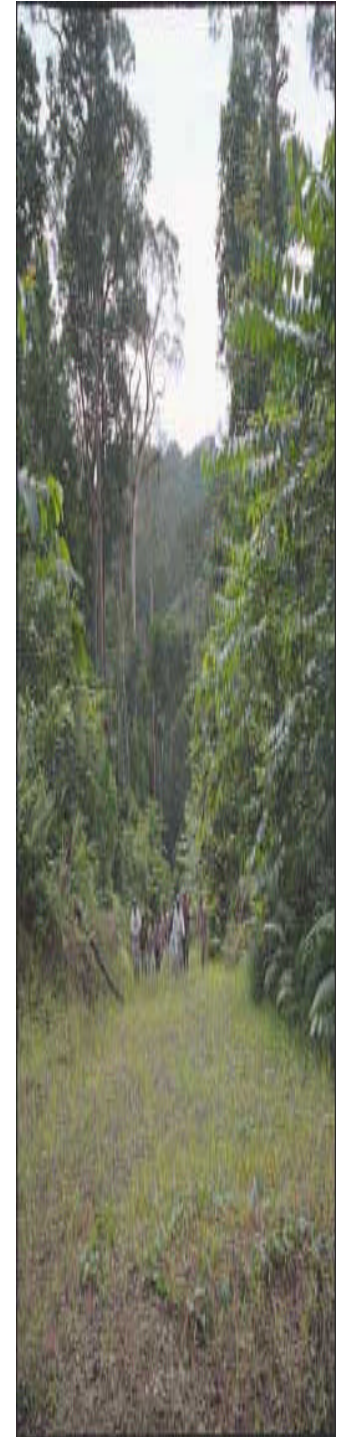


# Bringing degraded lands into production - Brazil...

**5,000 ha of previously deforested pastures will be integrally reforested with native fast-growing species;**

**7,000 ha of natural and secondary forest will be managed and rejuvenated; and,**

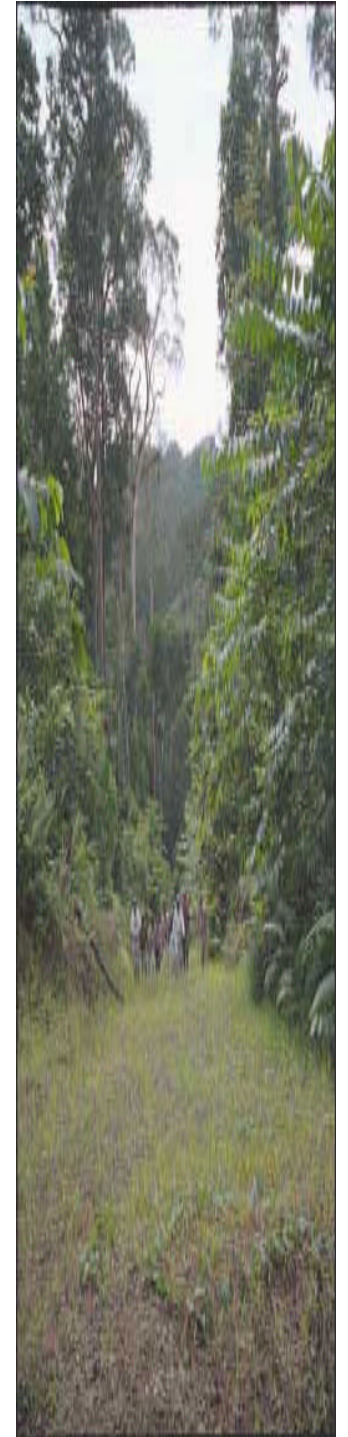
**an agroforestry buffer zone of neighboring colonists, who will be provided with long-term technical assistance by Instituto Pró-Natura.**



# Bringing degraded lands into production - Brazil...

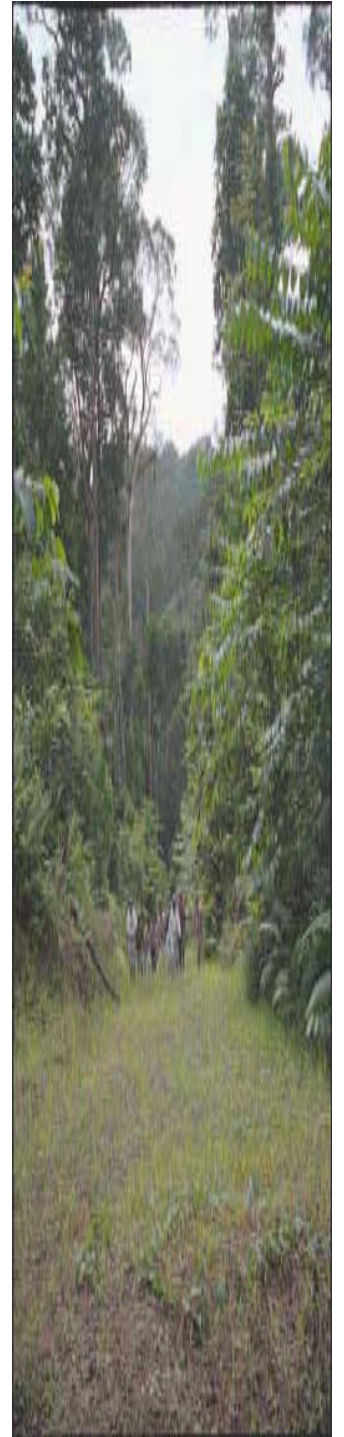
**Most of the 10 million trees will be planted in the first three years. Five tons of seeds from nearly 20 different species were collected from the old-growth forest surrounding the areas to be planted.**

**The collection drive received substantial support from local and regional officials, including the Ministry of Agriculture, as well as from the local population, which participated massively.**



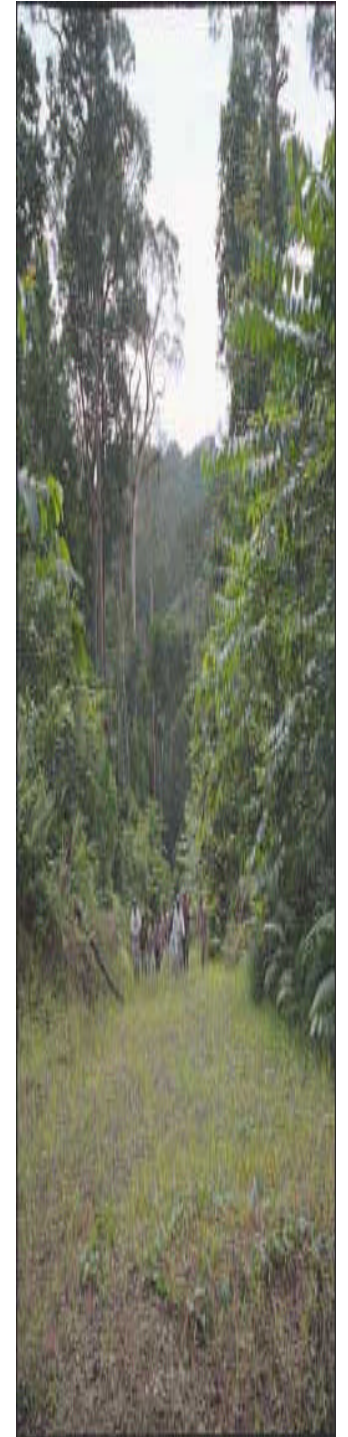
# New South Wales, Australia

- Proposed carbon pool structure
- trading regime and Sydney Futures exchange;
- The State Forests of NSW entered into strategic partnerships with two NSW electric utilities, Pacific Power and Delta Energy, that use plantations to offset the utilities' greenhouse gas emissions.



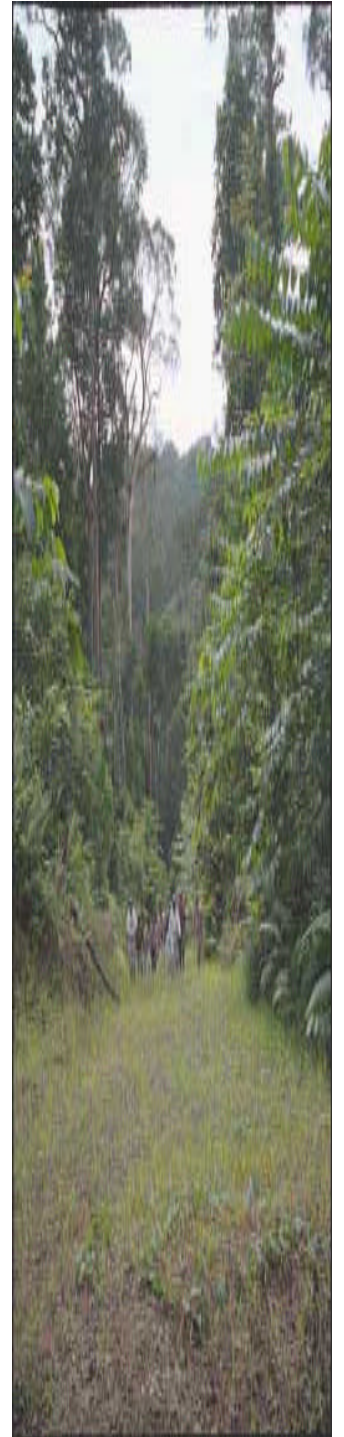
# New South Wales...

- Pacific Power purchased 4,500 tons of carbon rights from 1000 hectares of eucalyptus hardwood plantations established by the State Forests of NSW on former pasture lands.



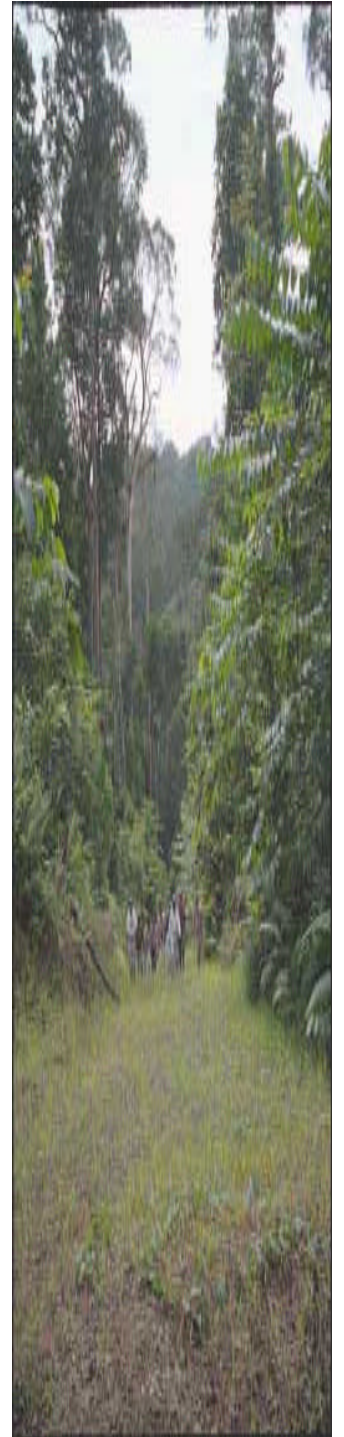
# New South Wales...

- Delta Energy entered into a Softwood Plantation Deed with the State Forests, purchasing 5,775 tons of carbon rights over 30 years;
- Resulting from 41 hectares of softwood plantations (*Pinus radiata*) that the State Forests will plant and manage on Delta Energy's pastoral lands.



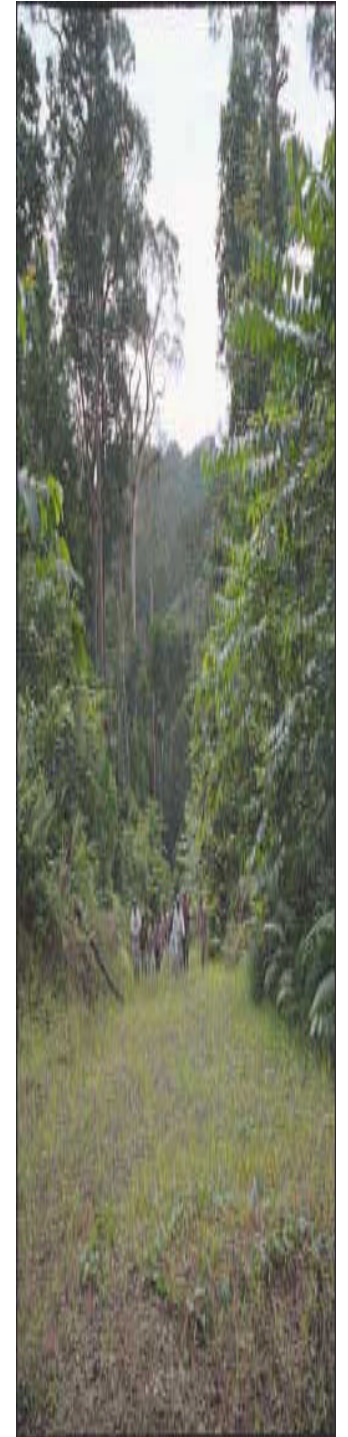
# Agroforestry - Mexico

- Representative of agroforestry as a carbon offset opportunity is the Scolel Té carbon sequestration project undertaken in nine Mayan indigenous communities located in the highland and lowland eco-regions of Chiapas, Mexico.



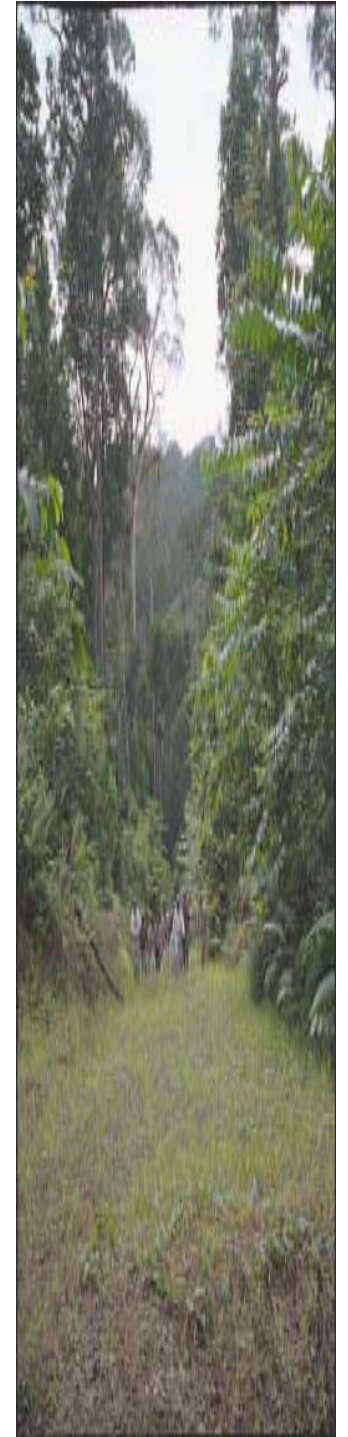
# Agroforestry - Mexico...

- Scolel Té (a Mayan phrase for “growing trees”) focused on preventing further loss of carbon through forest reforestation and agroforestry.
- Without the sustainable forest management program it was estimated that a 2 to 3 percent annual loss of forest would occur.



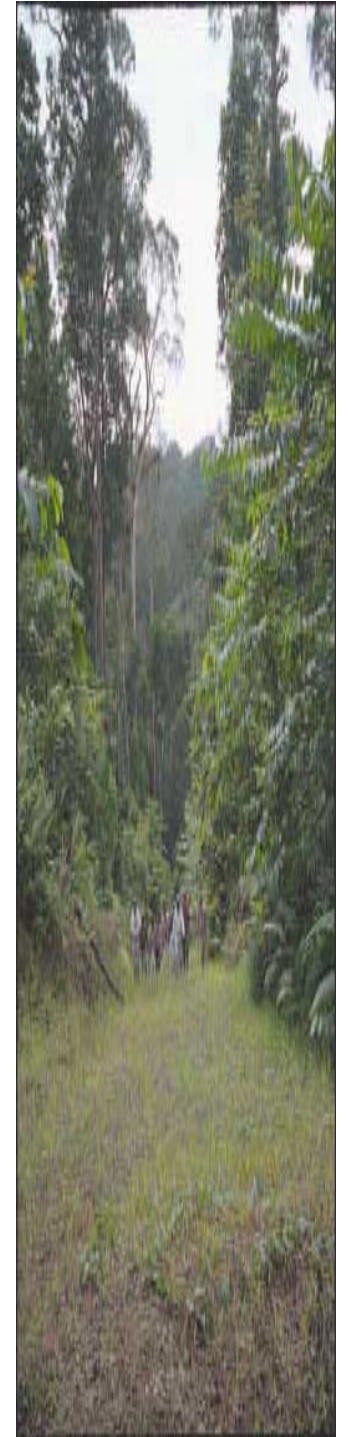
# Agroforestry - Mexico...

- The 2,200 hectare area includes a range of projects such as live-fences, enriched fallow areas, coffee/shade trees, Taungya-projects, and reforestation and forest preservation silviculture projects.



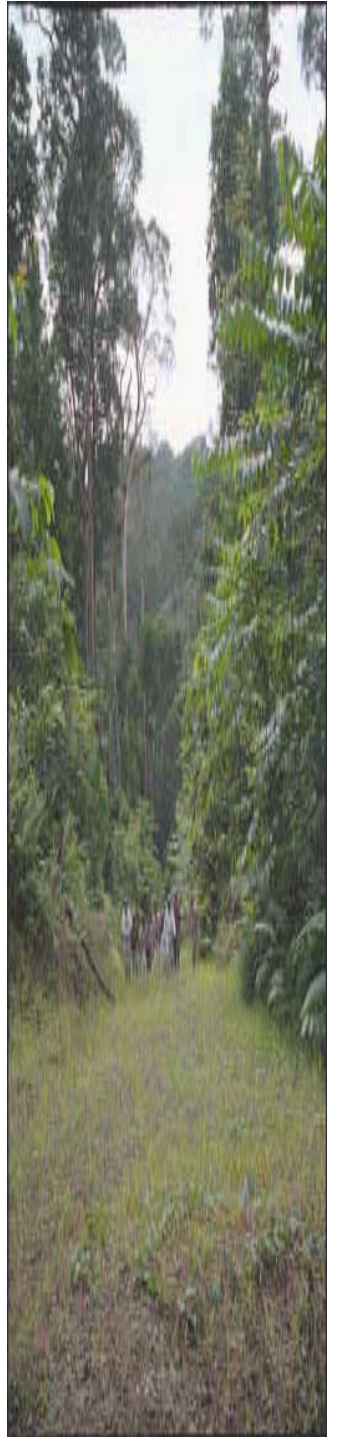
# Agroforestry - Mexico...

- 333,000 tons of cumulatively sequestered carbon over 30 years, at a cost of \$10 per ton.
- One funder was the Intl Auto Federation, committed to offsetting carbon emissions from sponsored car races.



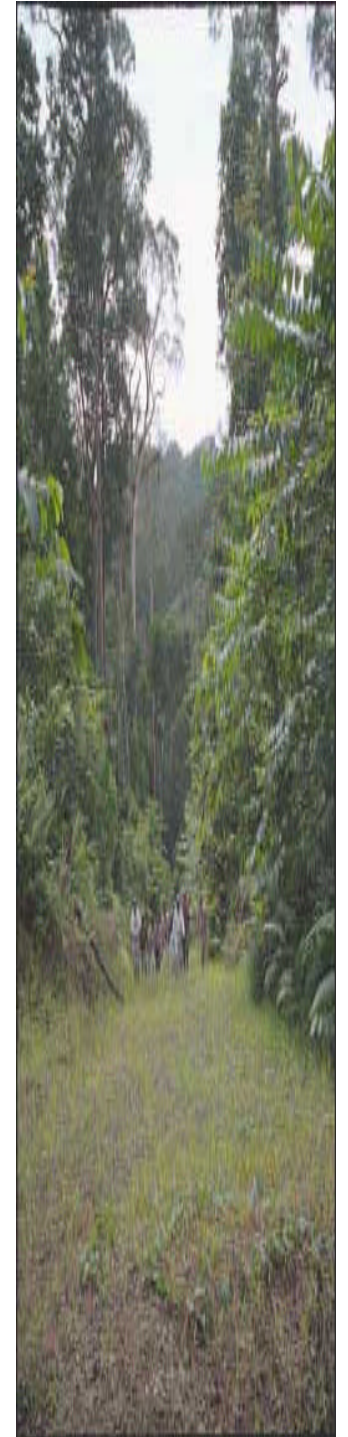
# Emergent or No Emergence?

- Key Interest Groups Skeptical (e.g. Greenpeace, WWF, NRDC), want real reductions
- Developing Countries want tech transfer
- Forestry interests poorly represented
- Early emphasis on forestry backfired
- Technical questions do exist



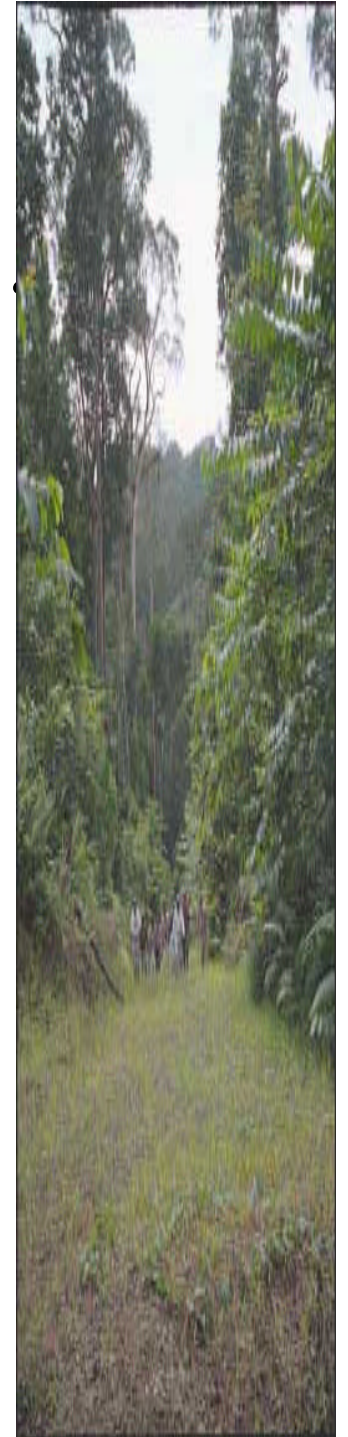
# Emergent or No Emergence?...

- Permanence, leakage, quantification, monitoring and verification issues
- Can forestry be detrimental?
  - Plantations, removal of frontier forests
- Unresolved Kyoto LUCF definitions/issues
  - Application to CDM up in the air
  - Annex I LUCF applications uncertain



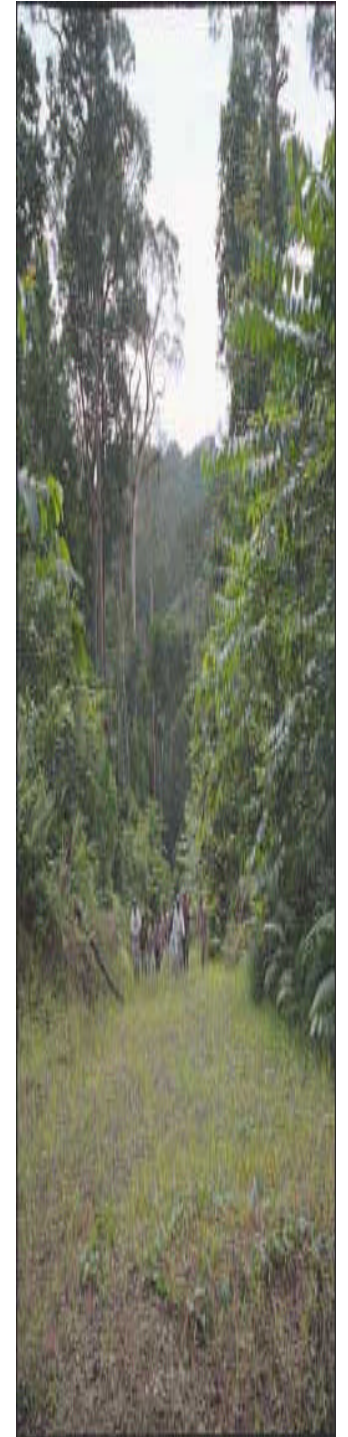
# Emergent or No Emergence?...

- All Forestry not created equal (same true of energy options)
  - projects vary widely
    - **in source of GHG benefits**
    - **in cost-effectiveness**
    - **in co-benefits**
    - **in performance against key criteria**
      - **Additionality, quantifiability, leakage, permanence**



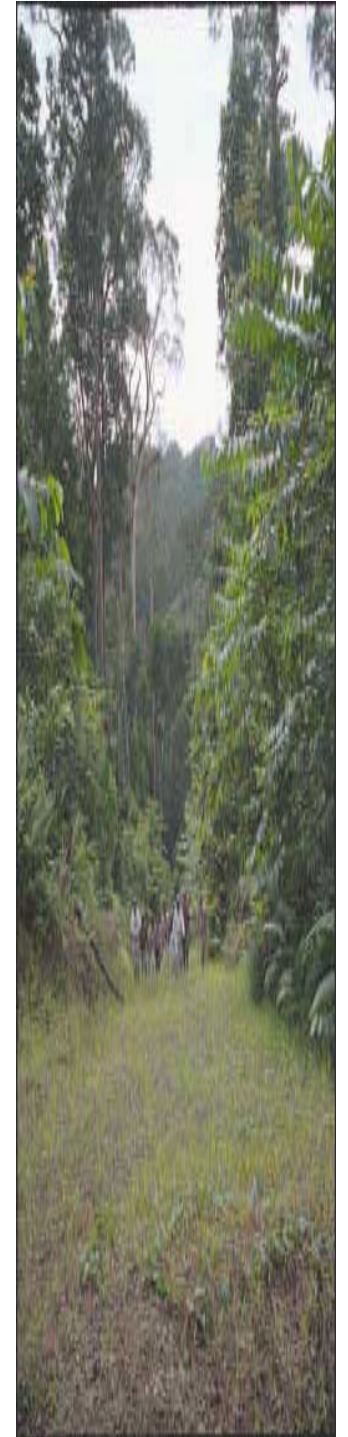
# Emergent or No Emergence?...

- Land use and Biotic Mitigation Policy Project
  - goal to develop politically and technically credible answers to key questions
- Need to Approach Solutions Consistently
  - in forestry and energy sectors
- Need to Disseminate Solutions
  - Massive ignorance prevails



# Emergent or No Emergence?...

- Thinking Reactively vs Pro-Actively
- Building the Business Case
- Identifying the variables
- understanding forest industry interests
- Looking at individual projects
- Exploring what companies can do



# Conclusion

- Kyoto has set new process in motion
- Ratification the likely outcome
- risk management an appropriate response
- risks and opportunities being identified
- early actors seizing opportunities
- billion dollar question: will fear or markets prevail in driving climate change mitigation in short to medium term?

