



# Improving estimates of national biomass carbon stocks in tropical forests

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## Why improve biomass estimates?

- REDD approach requires knowledge on the amounts of carbon in tropical forests
- Estimates on national REDD potentials are also limited by uncertainties in carbon stock estimates
- Principal sources of uncertainties
  - Inherent variation in data structure and quality
  - Diversity of forest types
  - Quality of forest inventories
  - Availability of allometric equations
  - Reliable wood density data



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## How variable are these data?

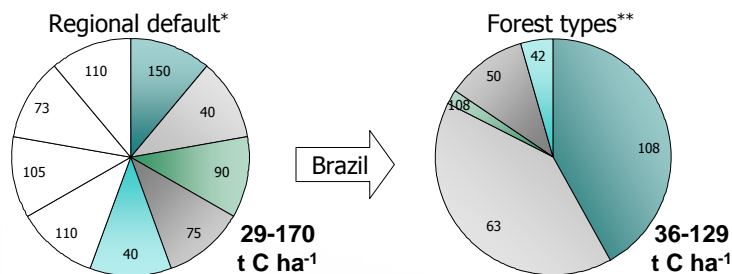
- Global level
  - Different countries / continents
  - Different floristic regions
- National level
  - Different approaches to forest management and monitoring
  - Data acquisition not necessarily targeted at carbon assessment



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## Why partition into forest types?

- Forest as a patchwork of different forest types
- Different structure – different biomass
- Consistency (e.g. IPCC default forest types)
- Incentive for countries to report on forest types



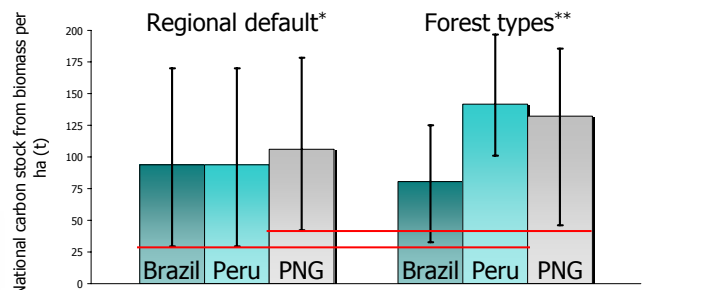
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\* FAO FRA 2005 / IPCC GPG (AFOLU)

\*\* Brazilian Ministry of Science and Technology

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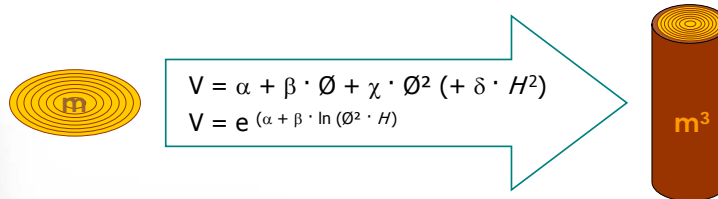


## How to improve inventories?

- Compromise between precision and feasibility
- Prime example: PNG permanent forest monitoring plots
- Suggestions on parameters to record:
  - Minimum plot size 0.5 ha
  - Minimum tree dbh threshold  $\varnothing \geq 10$  cm
  - Tree height measurements additional
  - Taxonomic information highly desirable
  - Representation of all forest types necessary

## What are allometric equations?

- Conversion of inventory parameters into timber volume
- Stand specific
- Laborious
- One single effort: Investment



V = volume;  $\varnothing$  = diameter; H = height;  $\alpha, \beta, \chi, \delta$  = coefficients

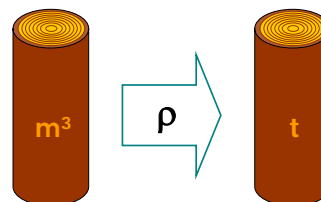
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## Why attend to wood density?

- Crucial factor in the conversion of volume to mass
- Highly variable → important source for uncertainty
- Look-up in databases if floristic data is available

More detailed account at  
the ASB-ICRAF side event  
'Estimating Carbon Stocks  
in Forested Landscapes'  
at the CIFOR Forest Day



$\rho$  = density

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## Where to fight uncertainties?

Source of error	Aggregation level	Error (%)	
		No / inadequate data	Recommended approach
Forest types	National	70	< 50
Plot size	Forest type	40	< 20
Appropriate allometries	Forest type	50	< 10
Wood density	Forest type	10	< 2
Precision of measurements	Plot	5-60	

## Conclusions

- Strong imperative for increasing efforts in improving biomass estimates
- Experience with several tropical countries proves that such high quality estimates can be achieved
- Only manageable efforts required
- Improved biomass estimates yield higher accuracy and precision in national carbon stocks
- Such estimates benefit the country as error is reduced and thus the most conservative carbon stock value is expected to rise

# Thank you for your attention



ASB-ICRAF side event

## Estimating Carbon Stocks in Forested Landscapes

CIFOR Forest Day

Saturday, Dec. 8th, 16:00 – 17:30

Lombok Room - Ayodya Hotel

[jdietz@bgc-jena.mpg.de](mailto:jdietz@bgc-jena.mpg.de)



ECOFYS

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