



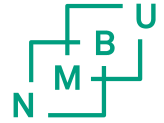
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How to set reference levels for REDD+ (FRELs)

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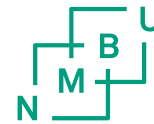


Why RL (FREL) is key

- Emissions reduction = actual emissions – FREL
- Actual emissions

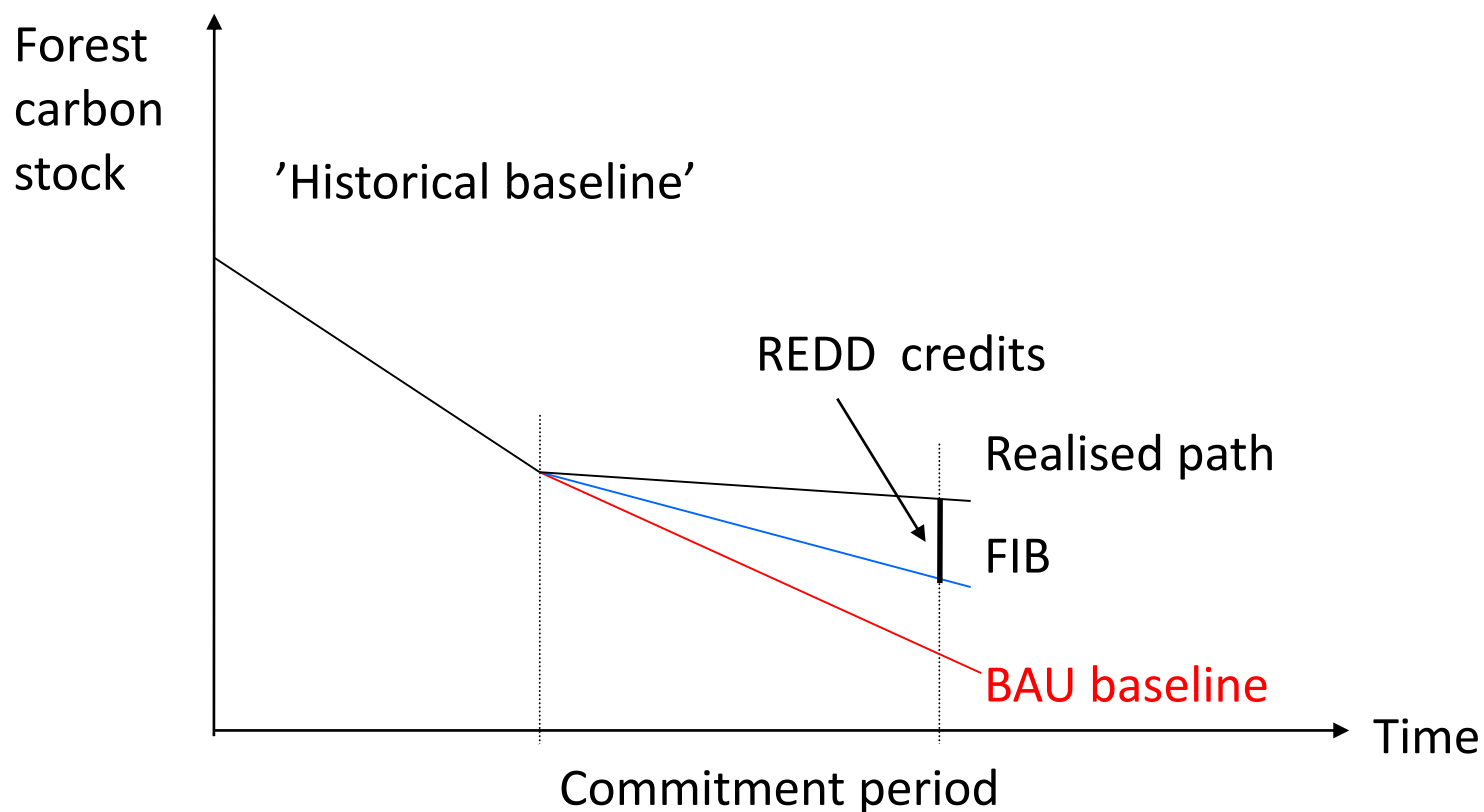
$$\Delta C \approx \Delta H * \frac{C}{H} + H * \Delta \frac{C}{H}$$

- activity data (deforestation) – the main focus
 - emission factors
 - degradation
-
- Must compare to a FREL
 - Find the impact of projects and policies
 - Tanzania needs it to receive result based payments

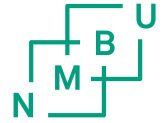


Reference levels:

1. BAU (*technical* – measuring ER) vs.
2. FIB (financial incentive benchmark) (*political* – assigning "quotas")



Emissions = negative change in forest carbon stock



Additional meanings:

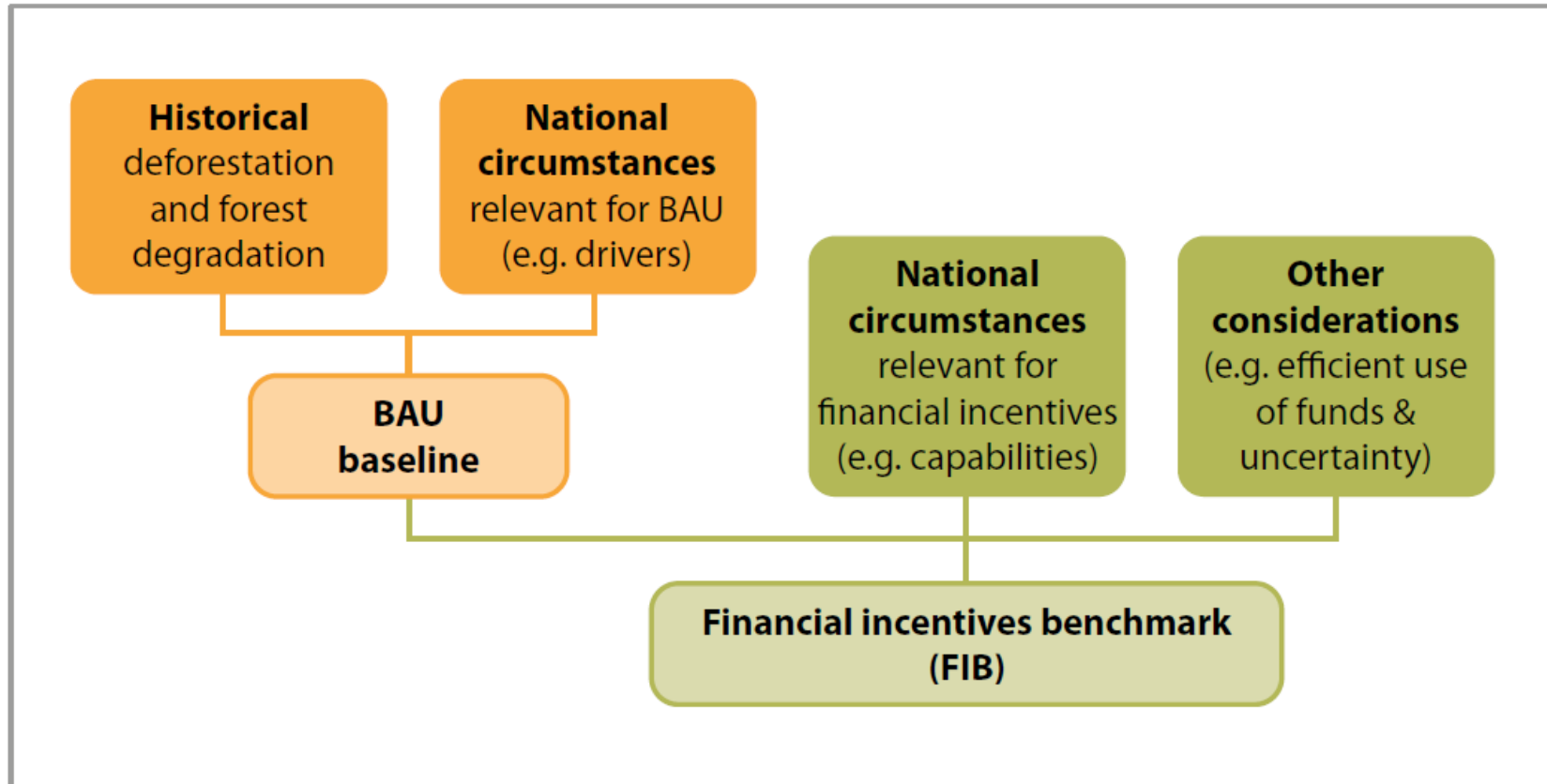
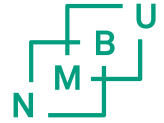
3. The contribution to international mitigation through REDD+ actions under the UNFCCC (UN REDD programme, 2015)

4. Aspirational target

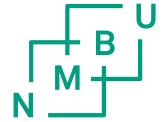
It's getting very confusing!

Talk about FREL as BAU

UNFCCC: Historical + National circumstances



UNFCCC guidance



One of four requirements: strategy, SIS, MRV, FRL

Decision 4/CP.15, §8 (Copenhagen)

Develop FREL/FRL, “taking into account historical data and adjust for national circumstances”

Decision 12/CP.17 (Durban)

§ 7: “[FREL/FRL] are benchmarks for assessing each country’s performance”

§9: include details on adjustment for national circumstances

§10: a stepwise approach may be useful ...

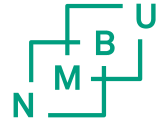
§11: subnational FREL/FRL possible as interim measure

§12: update “periodically as appropriate”

Guidelines:

- Comprehensive, complete, consistent, accurate and transparent

... UNFCCC guidance



Decision 13/CP.19 (part of Warsaw framework on REDD+)

§1: “each submission ... shall be subject to a technical assessment”

§2: “ ...might be technically assessed in the context of result based payments”

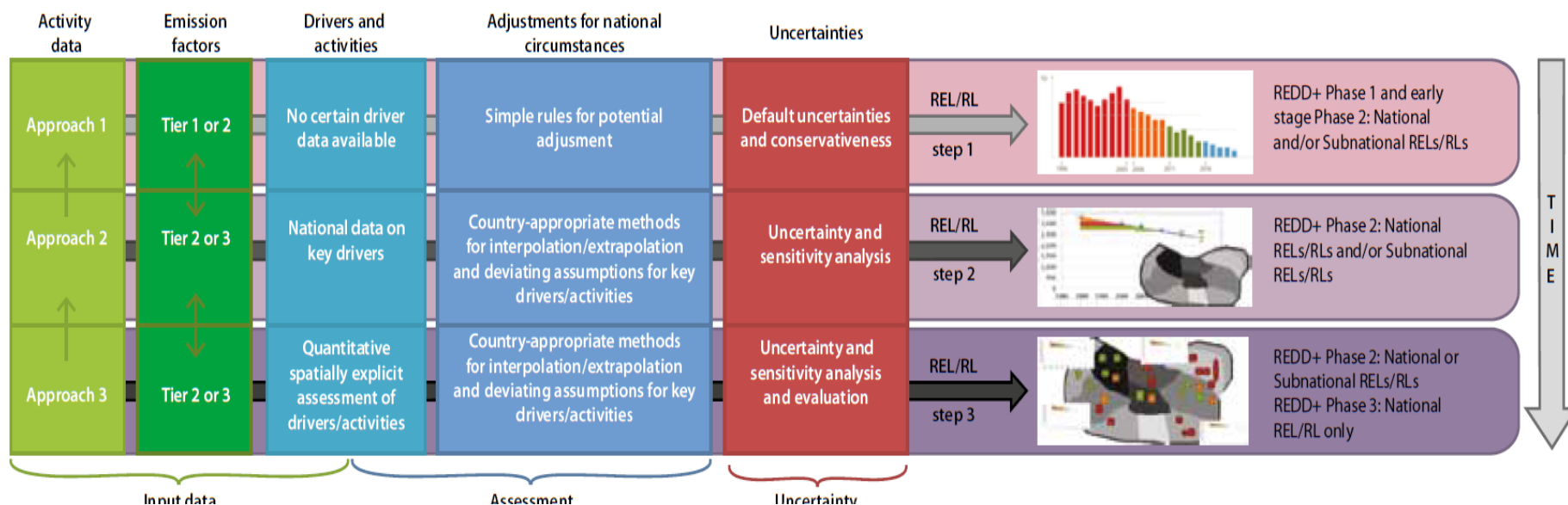
Annex with guidelines and procedures for technical assessment

- Check if in accordance with decisions
- “To offer a facilitative, non-intrusive, technical exchange of information ...”
- §4: “refrain from making any judgement on domestic policies taken into account in the construction of FREL/FRL”

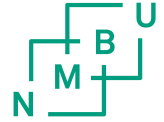
Observations:

- *shift from BAU (assess performance) to FIB (basis for payments)*
- *seen as purely technical issue, although it's to be used for payments*

Stepwise approach (Herold et al. 2011, 2012)

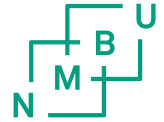


Submissions to UNFCCC



- 6 countries submitted:
 - Brazil, Ecuador, Mexico, Colombia, Guyana, Malaysia
 - Indonesia has a pending draft
- Purpose:
 - all are for result-based payment
- Scale:
 - sub-national for Brazil & Colombia (Amazon)
- Forest definition:
 - varies across countries

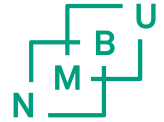
Activities



	Deforestation	Degradation	+ activities
Brazil	Yes		
Ecuador	Yes		
<i>Indonesia</i>	<i>Yes</i>	<i>Yes</i>	
Mexico	Yes		Forest fires
Colombia	Yes		
Guyana	Yes	Yes	SMF
Malaysia	Yes, from com. harv. in PRF		

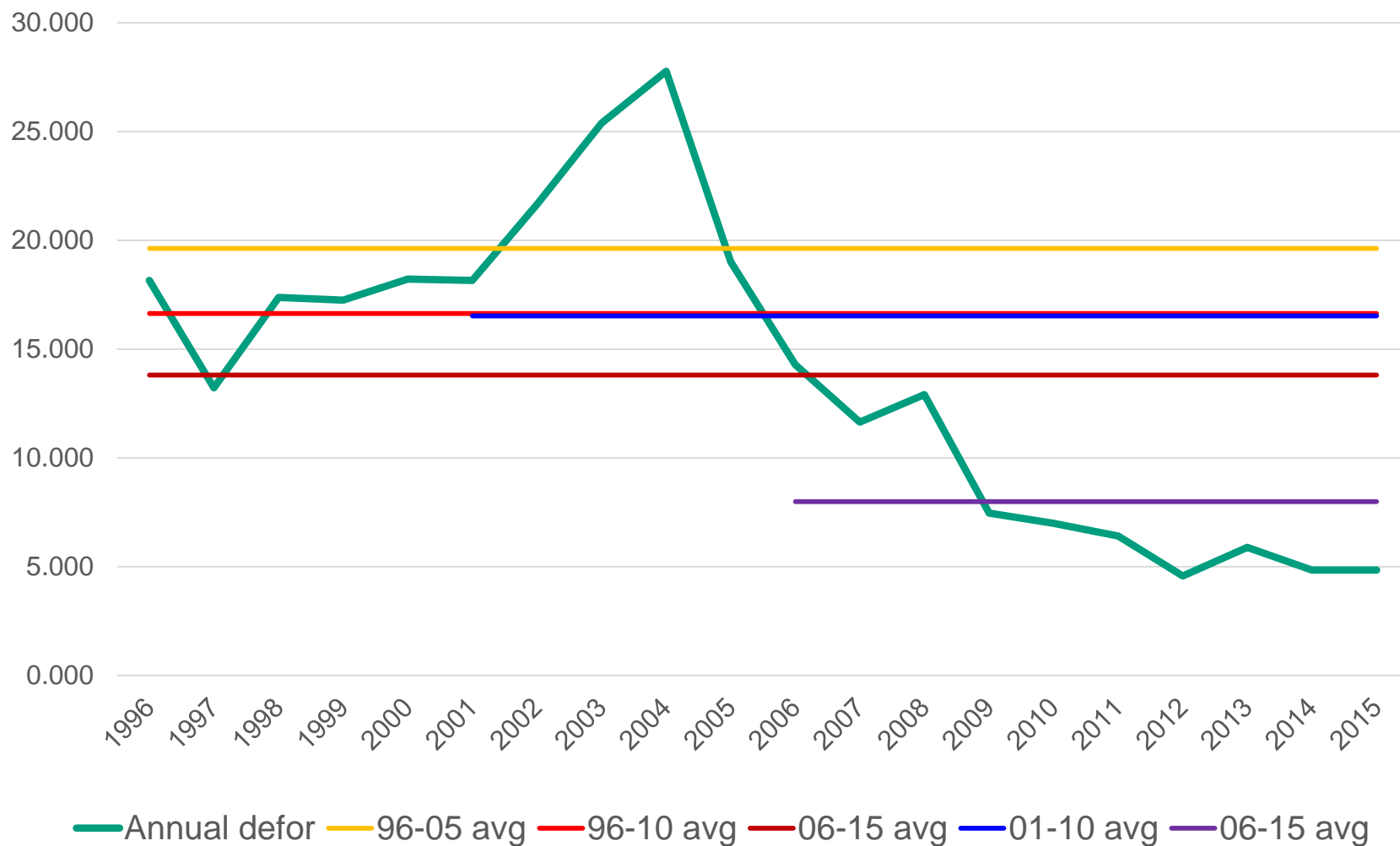
- Only 2 include degradation (Brazil in Annex, show positive correlation)
- Malaysia focus on reduced timber harvesting from Permanent Reserve Forests (PRF)

Reference period



	Historical Ref. Period	Crediting period	Comments
Brazil	10 years (1996-2005) 15 years (1996-2010) 20 years (1996-2015)	2006-2010 2011-2015 2016-2020	Long historical ref. period
Ecuador	2000-2008	2009-2020	Long crediting period
<i>Indonesia</i>	<i>2000-2012</i>	<i>2013-2020</i>	
Mexico	2000-2010	2011-2015	
Colombia	2000-2012	2013-2018	
Guyana	2001-2012	2013-2023	
Malaysia	1990-2005 1990-2010	2006-2010 2011-2015	Long historical ref. period

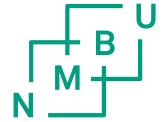
Deforestation, Amazon (Brazil), km²



Some observations

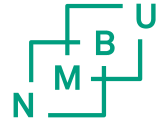
- Use 1996 as starting point (not 1990)
 - Average 1990-1995: 16 233 km²
 - Average 1996-2005: 19 625 km²
- Stick to 1996 as starting year, extend the end year
 - Not last 10 years as for Amazon Fund
 - Minor difference for 1996-2010 (16 638) vs. 2001-2010 (16 531)
 - Major difference for 1996-2015 (13 807) vs. 2006-2015 (7 989)
 - With 100C/ha & USD5/tCO₂, the difference is **USD 1.067 billion per year** (from 2016)

National circumstances



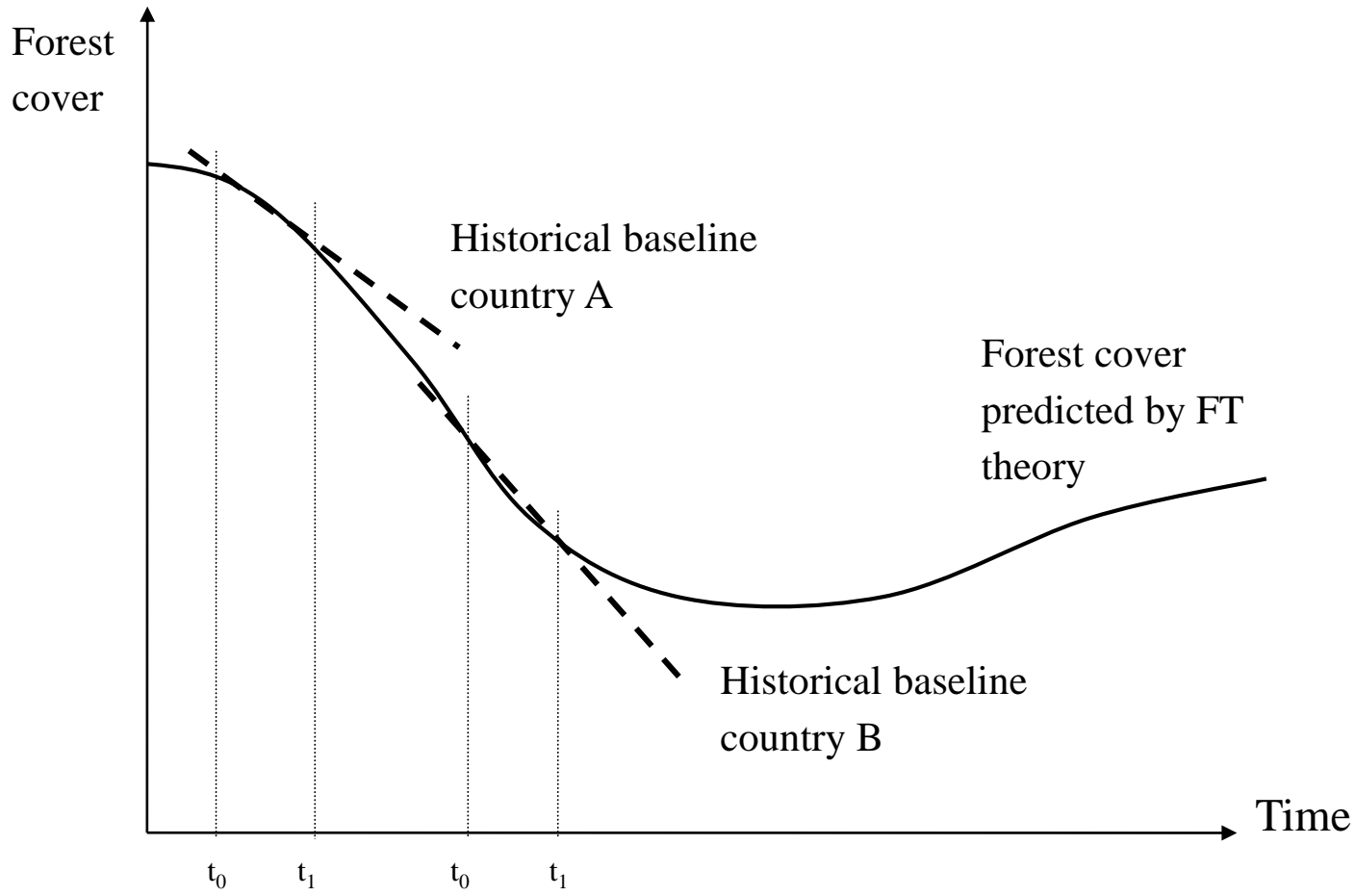
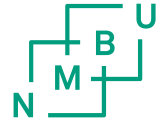
- Colombia
 - qualitative analysis of drivers
 - post-conflict scenario: 5-year-transition (deforestation above historical average)
 - conservative +10%
- Guyana
 - all drivers
 - use combined national and global historical deforestation (0.44%)
 - same approach as in MoU with Norway
- Malaysia
 - governance, forest management and GHGs
 - not used to adjust FREL

Results from 3 country analysis

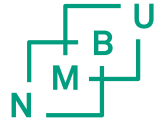


- Panel data from subnational units
- Regression model
- Forthcoming paper (with 4 countries)

FOREST TRANSITION

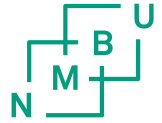


What does the FT tell us?



- An empirical regularity
- A set of drivers (Angelsen & Rudel, 2013):
 - Scarcity of forest products
 - Scarcity of forest env. services
 - Economic dev. (rural-urban migration)
 - Policy changes; PAs, governance, ...
 - Diminishing agric. rent (von Thünen & Ricardo)
 - Concentration of agric. in most productive areas
- An artifact (by definition):
 - Much deforestation where there is much forest
 - Little deforestation if there little forest left

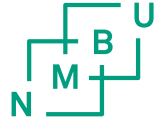
...FT



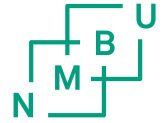
Stage	Defor. forces	Remaining forest
Core	No	Yes
Frontier	Yes	Yes
Mosaic	Yes	No

A simple idea,
and (therefore) potentially very powerful

Data & methods



- Three countries
 - Brazil (719 municipalities): period 2000 – 2009
 - Vietnam (64 provinces): period 1995 – 2009
 - Indonesia (371 districts): period 2000, 2003, 2006, 2009
- Use OLS; not enough data for panel analysis



Model specification matter!

Different specifications of dependent variable (deforestation)

1. Absolute levels

- Easier to interpret
- Units of analysis vary a lot in size
- Outliers impact results
- “Big areas have more deforestation”

2. Transformation, e.g. logarithms

- Outlier problem reduced (“big region” effect)
- Easy to interpret

... specifications

3. Rate of deforestation, relative to forest cover
 - Standard measure of deforestation
 - High rates in some low forest cover cases
4. Rate of deforestation, relative to land area
 - Lessens bias due to country's large stocks of forest cover
 - More in line with FT hypothesis

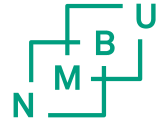
Tested these, and results are sensitive

Good theoretical reasons for choosing 4, so use that (in combination with logs)

Results

Variables	Brazil	Indonesia	Vietnam
Historical deforestation (elasticity)	+++ (0.4 - 0.65)	+++ (0.93 M1), 0.26-0.32)	+++ (1.4-1.5)
Trend in hist. deforestation	---	na	-
Forest cover (turning point)	+++ (~60%)	+++ (63-70%)	+++ (25-30%)
GDP	++/--	+++	0
Agricultural GDP	+++	++	0
Population density	--	---	--
Road density	--- (unoff.>official)	--	++
R2	0.79-0.83	0.60-0.79	0.50-0.52

Regression conclusions

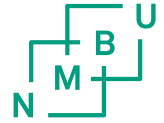


- Historical deforestation the key
 - Coefficients below one (Indonesia & Brazil) → simple extrapolation can be misleading
- Some evidence of forest transition (FT) hypothesis
 - FT supported when measured relative to total land area, otherwise mixed results
- Agric. GDP as a driver
 - but two-way causality
- Impact of some factors reflected in historical deforestation and forest stock, thus some unexpected results
 - Road density, negative
 - Population density, negative

...conclusions

- Limited increase in R2 by adding new variables
 - Limit the RL formula to 3-4 variables
- Main recommendation:
 - Higher than historical RL to HFLDs
 - Lower than historical RL to LFHDs
- Political risk that higher RL to HFLD countries, but not lower to LFHD countries
 - Introduce global additionalty constraint:
sum of RLs \leq global historical deforestation

FREL at project level



- VCS standards (tool)
- Before-After (BA)
 - Historical (continuation of pre-project land use)
- + Control-Impact (BACI)
 - Use DID
 - Recommended approach
- This is part of the GCS REDD+ project of CIFOR
 - 2 intensive sites in Tanzania (TFCG, TaTEDO)
 - Writing up results

By way of conclusion

- FREL critical to
 - Assess impacts
 - Make payments
- Tricky
 - The counterfactual
 - Poor data
 - Perceptions
 - status quo/historical extrapolation
 - forest transition as a useful framework

