

Data uncertainties at country level and implications for reference emission levels for REDD incentive schemes

REDD: Steps towards a mitigation mechanism

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- Any RED mechanism in a post-2012 climate regime has to establish a measure to calculate the performance of the participating countries in reducing deforestation. For this purpose a **reference level** is necessary against which the achieved efforts of participating countries are compared which forms the basis for the compensation.
 - 1) Historic emission levels
 - 2) Projected future levels

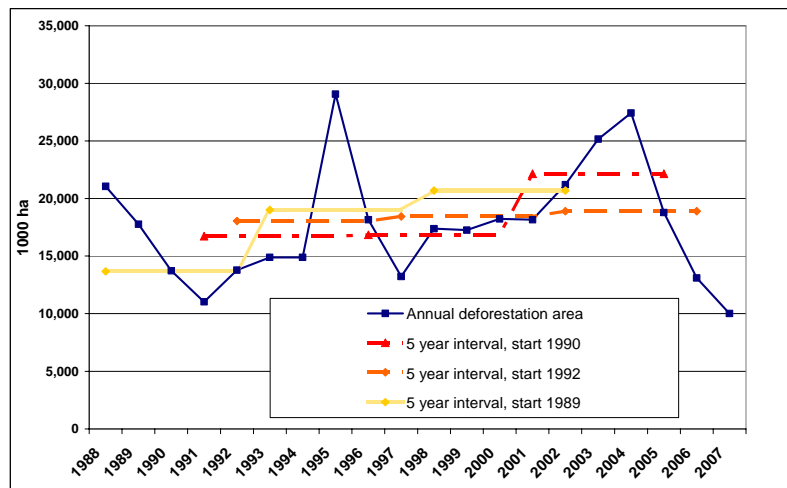
Projected future emission levels

- **With few exceptions (Brazil, India), there is no information on annual historic deforestation trend**

Without good information on the past, it is impossible to project the future in a reliable way.

⇒ Example Brazil

Deforestation in Amazon region in Brazil



Projected future emission levels

Relationships between deforestation drivers and deforestation

Deforestation drivers may be known, but

- the strength of drivers is not well understood;
- the influence of drivers is variable over time and depends on national circumstances;
- the interrelationship between drivers may be significant;
- Changes in key policies (e.g. land tenure rights) can be abrupt (e.g. government changes) and can potentially not be addressed in models

⇒ **Modelling of future deforestation at country level will not be reliable**

Historic emission levels

1. Definition of historic period
2. Historic forest area changes
3. C stock changes and GHG emissions related to these area changes

Definition of reference period

- **No base year due to high annual fluctuations**
- **Country-specific period – Options to select ‘representative’ years – generic period**
 - Allocation under EU ETS in period 2005-2007 showed what happens when countries can select the most favourable years for accounting purposes: EU ETS over-allocation in 1st phase 2005-2007 because not the most representative years were chosen, but those with highest emissions
 - For a REDD mechanism such selection options would result in a choice of years with highest emissions from deforestation and a likely overestimation of past average deforestation. The reduction against such selective period may likely not present a real reduction in deforestation
 - Generic period = same period for all countries should be chosen.
 - Exceptions should only be driven by data availability problems, e.g. no cloud-free satellite images available for a country for a specific year

Definition of reference period

Which period to choose?

- **Consistent time-series data on area changes extremely important for the measurement of emissions reductions**
- **Different methods for area determination used at different points in time may result in considerable time-series inconsistencies and the resulting decrease in emissions may mainly be due to methodological changes**
- **Start of historic period depends on the availability of consistent datasets, not earlier than 1990**

Definition of reference period

- The most recent year that enters the reference level needs to be defined.
- A recent year should be chosen in the period before the countries decide on their participation in a RED mechanism to avoid that the reference levels can be actively increased by deforesting larger areas.

Historic forest area changes

- **Sampling or wall-to-wall approach (coverage of the full spatial extent of the forested area)**
 - Some studies suggest that >80% coverage of a region necessary for an accurate estimate of deforestation
 - In some years considerable revisions of deforestation rates in Brazil between preliminary estimates based on a sampling approach and final estimated based on wall-to-wall approach
 - If sampling approach is allowed, it has to be proven that an agreed level of uncertainty is achieved

Historic forest area changes

- For a time series from 1990 to recent years, a number of satellite sensors and methods have to be combined:
How consistent are time-series on forest area changes produced on the basis of different satellites and different sensors?
- For the analysis of satellite data different software tools and different analytical methods are used:
Do different teams with different tools produce the same results? In this area we do not have any methodological guidance yet.

Historic forest area changes

- Different monitoring methods exist for forest area changes (e.g. satellite data, forest inventories)?
How consistent are the results? Can potential inconsistencies be explained? If both datasets exist and if results are inconsistent, which data is correct?
- Scientific focus is on improving the remote sensing methods, not on the production of consistent historic time-series. However, for an accounting mechanism, latest satellite technologies are useless, if no consistent data is available for past forest area changes

Historic forest area changes

- Currently annual time-series only available for Brazil and India for historic years.
- For an RED accounting mechanism, annual forest area change data based on remote sensing methods have to be established.
- In many countries, the determination of forest area changes based on remote sensing methods is currently an area of research work (with the exception of Brazil and India), but has not yet been implemented in a permanent national institutional setting on a periodic (annual) basis.
- This institutionalization needs considerable capacity-building activities and substantial financial resources.

Biomass and C stock changes

- 2nd step for reference emission levels: detected area changes have to be converted into carbon that was saved or reduced with decreasing deforestation rates.
- The C content in biomass stocks depends on the forest type as well as the level of degradation of the forests.
- There are many uncertainties and data gaps related to accurate estimation of biomass changes due to deforestation.
- However, for accounting purposes under a future RED mechanism, the final estimate does not necessarily need to be accurate, but it has to be consistent over time and conservative.

Biomass and C stock changes

- **Conservative** means that the methods should ensure that at least the amount of emissions for which a country is compensated, was really reduced whereas the real emission reduction may be higher.
- This is an important difference to the task of producing reliable estimates for global, regional or national emissions from deforestation.
- Accounting approach based on different tiers could be implemented depending on the data availability in the participating countries

Biomass and Carbon stock changes

Default method – no country-specific data available

- Weighted average of aboveground biomass C stocks across forest types can be established based on IPCC default C stock estimates for forest types and FAO data on spatial distribution of forest types from global forest ecosystem mapping approaches.
- The lower value of the range of C stocks for different forest types should be used for the accounting purposes.
- If the country is not able to provide data on the share of intact and degraded forests at national level, a general discounting factor could be applied assuming that the forests that would have been deforested in the absence of a RED mechanism would have been degraded to a certain extent. This assumption is consistent with the real situation that deforestation often occurs to a larger extent after forests have been made accessible through road infrastructure and selective logging.

Biomass and C stock changes

- **Higher tier method** – Country-specific data available
- Use of country-specific estimates for C stocks, differentiated to forest types and level of forest degradation.
- Historic reference emissions should be calculated with the same method.

Exclusion from accounting

- **Only account for aboveground biomass, because**
Changes in other pools, in particular in **soils**, largely depend on the subsequent land uses to which the deforested areas are converted. The areas where deforestation was reduced can neither be located spatially nor can the subsequent land uses of hypothetical clearings be determined at national level. Therefore the accounting method should only refer to aboveground biomass.

Exclusion from accounting

- **No accounting for Non-CO₂ gases, because**

Emissions of non-CO₂ gases are mainly related to the occurrence of **forest fires** for deforestation. It is hypothetical to determine how areas saved from deforestation would have been cleared. National defaults could be developed based on the role of fires in deforestation and would need to be applied for the historic reference level and the commitment period years. However, the impact of fires faces strong annual variability depending on climate effects in particular years. This means, such national defaults would fluctuate strongly over time. The efforts required to develop a reliable annual and historic national defaults seem too high compared to the benefits of such approach.

Conclusions

- **For accounting purposes, the final estimates for reference emission levels and commitment period emissions do not necessarily need to be very accurate, but they need to be consistent over time and they should be conservative.**
- **The uncertainties related to C stock estimation can be overcome by using conservative default factors and assumptions consistently for the reference level and the commitment period.**
- **The more difficult problem to resolve is the establishment of consistent and comparable time series for forest area changes from historic to future years. This problem can be resolved, however additional methodological work and substantial resources are needed.**

Thank you for your attention !!!

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