Task Force on National Greenhouse Gas Inventories

Revisiting the Use of Managed Land as a Proxy for Estimating National Anthropogenic Emissions and Removals

Report of the IPCC Expert Meeting, May 2009, INPE, São José dos Campos, Sao Paulo, BRAZIL

Simon Eggleston, IPCC-TFI-TSU

Second Workshop on the Revision of the UNFCCC Annex I Reporting Guidelines for Reporting of Inventories under the Convention, 3–4 November 2010, Langer Eugen, 1916 Bonn, Germany

ipcc
INTERGOVERNMENTAL PANEL ON climate change

Reporting Anthropogenic

- The UNFCCC requires the estimation and reporting of anthropogenic emissions and removals of greenhouse gases not covered by the Montreal Protocol.
- Generally the definition of anthropogenic emissions is clear.
- However, emissions and removals associated with land use activities (LULUCF and/or AFOLU) occur together with those of natural origin, and it is not always straightforward how only to estimate the anthropogenic components.
- In 2003 the IPCC reported that "*The scientific community cannot currently provide a practicable methodology that would factor out direct human-induced effects from indirect human-induced and natural effects for any broad range of LULUCF activities and circumstances*".

WMO UNEP

ipcc
INTERGOVERNMENTAL PANEL ON climate change

Managed Land Proxy

- Therefore the IPCC Guidelines have adopted the use of estimates of greenhouse gas emissions and removal on managed land as a proxy for the estimation of anthropogenic emissions and removals.

"*Managed land is land where human interventions and practices have been applied to perform production, ecological or social functions.*"

(2006 IPCC Guidelines)

- Since 2003 the scientific understanding of the drivers of greenhouse gas fluxes from LULUCF sources has developed and so the IPCC decided to revisit the use of the managed land proxy.

WMO UNEP

ipcc INTERGOVERNMENTAL PANEL ON climate change

Assumptions

i. *all direct human-induced effects on greenhouse gas emissions and removals occur on managed lands only.*

ii. *many indirect human influences on greenhouse gases (e.g., increased N deposition, accidental fire) will be manifested predominately on managed lands, where human activities are concentrated..*

iii. *while local and short-term variability in emissions and removals due to natural causes can be substantial … the natural 'background' of greenhouse gas emissions and removals by sinks tends to average out over time and space*

- None are universally true

WMO UNEP

ipcc INTERGOVERNMENTAL PANEL ON climate change

Meeting Conclusions

Managed Land Proxy

- Despite valid concerns, the managed land proxy remains a globally applicable, assessed and approved method for separating anthropogenic emissions and removals.
- The meeting noted that the managed land proxy is a first approach for distinguishing between anthropogenic and non-anthropogenic emissions and removals, and is the current approach in the 2003 Good Practice Guidance for Land Use, Land-use Change and Forestry and the 2006 Guidelines for National Greenhouse Gas Inventories.
- Refinements are being developed that so far can only be implemented with higher tier methodologies

Shortcomings

- The meeting recognised that the managed land proxy has several shortcomings and that for some national circumstances natural disturbances can play a significant role in fluxes from managed land.
- For some countries and circumstances, use of the managed land proxy may lead to emission and removal estimates dominated by natural effects occurring on managed land and this would need to be recognised where inventory estimates were used in estimates of anthropogenic or management effects.

WMO UNEP

ipcc INTERGOVERNMENTAL PANEL ON climate change

Inter-annual variations

- Inter-annual variations in fluxes (driven by natural effects) may swamp the changes in fluxes due to mitigation efforts and there may be significant background uptakes.
  - Tier 1 and Tier 2 approaches may not result in emission and removal estimates with significant inter-annual variability as input data may be averaged.
  - Tier 3 can result in significant inter-annual variability where annual climatic effects and annual area disturbed are more correctly represented or measured.
- Inventories estimate annual emissions and removals – they do not try to remove or reduce the impact of inter-annual variations (e.g. those caused by climate effects)
  - subsequent accounting (e.g. Kyoto Protocol accounting rules) can average out this variability in a transparent manner if so desired.
- However there is a requirement to be able to identify the impact of mitigation and management efforts

WMO UNEP

ipcc INTERGOVERNMENTAL PANEL ON climate change

Possible Replacements for the Managed Land Proxy

- The methods considered by the meeting were:
  - Maintenance of the managed land proxy;
  - Component separation (quantify the influence of different drivers and then identify which drivers contribute to anthropogenic emissions);
  - Comparison of two time series (that represent two different levels of human activities, e.g. current management and no management, or improved management vs. business as usual management) ;
  - Default factors and optimal fingerprinting (without quantifying the relative contributions, apply a default factor which indicates the impact of the human activity);
  - Activity based approach (estimate emissions by different activities and sum up anthropogenic contributions)

WMO UNEP

ipcc INTERGOVERNMENTAL PANEL ON climate change

Assessment

- The participants recognized that these methods, which largely involve Tier 3 representation of ecosystem dynamics, could potentially refine the estimation of anthropogenic emissions and removals but considered that they needed further work; in particular:
  - with regard to the science;
  - methodological implications;
  - data requirements,
  - Tier 1 – 3 variations,
  - and consistency with the general principles of inventory guidelines.
- The meeting hoped that further work by the scientific community will result in more mature approaches which can be assessed at a later date.

WMO UNEP

ipcc INTERGOVERNMENTAL PANEL ON climate change

What do we mean by *anthropogenic*?

- A clearer common understanding of "anthropogenic" is needed particularly in relation to the distinction between "direct", "indirect" and "natural" effects, and how to classify effects that have a range of natural and direct influences, for example
  - ❖ where there is a natural origin (e.g. wild fire) but the emission is mainly determined by direct anthropogenic factors (e.g. harvest and re-planting) or
  - ❖ where there is an anthropogenic origin (e.g. fire ignition) but the magnitude of the emissions is affected by natural causes (e.g. extreme drought or high fuel loading due to tree mortality from pest outbreaks or windthrow).
  - ❖ One issue that will need to be addressed is how to deal with areas with significant natural fluxes, so that emissions estimated using the current IPCC guidelines do not reflect the changes seen by the atmosphere. This situation occurs in other sectors but is particularly acute in the wetland sector.

WMO UNEP

ipcc INTERGOVERNMENTAL PANEL ON climate change

Summary

ipcc INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

Managed Land Proxy

- Anthropogenic emissions and removals should continue to be estimated as the emissions and removals from managed land
  - ❖ This approach was specified in the 2003 Good Practice Guidance for LULUCF and continued in the 2006 IPCC Guidelines
  - ❖ Managed land is land where human interventions and practices have been applied to perform production, ecological or social functions
- The Managed Land Proxy remains a globally applicable, assessed and approved method to identify anthropogenic emissions and removals
  - ❖ Alternatives have been proposed but need further development and assessment before they can be widely recommended.

WMO UNEP

ipcc INTERGOVERNMENTAL PANEL ON climate change

Further Conclusions

- A clearer understanding of “anthropogenic”, “direct”, “indirect” and “natural” is needed
- Continuing research needs:
  - ❖ to quantify the contribution of indirect human and natural causes of emissions and removals
  - ❖ to develop methods for factoring out direct human impacts from all others
  - ❖ on issues surrounding wetlands of all kinds

WMO UNEP

ipcc INTERGOVERNMENTAL PANEL ON climate change

Task Force on National Greenhouse Gas Inventories

Thank you

ipcc
INTERGOVERNMENTAL PANEL ON climate change