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Carbon Storage Accounting in Brazilian Harvested Wood Products

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Abstract

Brazil is one of the world's leading manufacturers of forest products, and 94% of the raw material comes from cultivated forests, mainly of the Pinus and Eucalyptus genera. Harvested wood products (HWP) can be an important carbon pool, based on the estimated carbon stored in the products in use. Thus, as of 2006, the IPCC began to allow the inclusion of these estimates in national inventories of greenhouse gas emissions. However, Brazil only started to consider these removals and carbon emissions by HWP in the 2020 version of the inventory (base year 2016). The primary data of forest production used in this study were obtained from the database of FAO (FAOSTAT) and of IBGE (Brazilian Institute of Geography and Statistics). Only products manufactured with raw material from planted forests were considered. The methodology for calculating the emission and removal of carbon dioxide followed the IPCC guidelines defined in 2006. Three groups of products were considered: sawnwood; wood-based panels; and paper and cardboard. Of the three approaches commonly used to estimate carbon absorption and emission, the most advantageous calculation was the atmospheric flow method, which is based on carbon fluxes rather than stock changes. This approach benefits major wood products exporting countries, such as Brazil. To calculate the estimates, production in the last year (2016) of 13.4 million m^3 of sawnwood, 9.63 million m^3 of wood panels and 10.3 million tons of paper and cardboard were considered. The estimates obtained indicate that, in 2016 (considering the period 1990-2016), the annual net contribution of forest products estimated by the atmospheric flow approach was the removal of - 50,772 Gg of CO_2eq. This removal corresponds to about 3.5% of Brazil's total emissions and 12.8% of LULUCF (Land Use, Land-Use Change and Forestry) activities emissions.

Objective

- Estimating and accounting net emissions of CO_2 from Harvested Wood Products (HWP) in Brazil, on basis in IPCC 2006 (IPCC Guidelines for National Greenhouse Gas Inventories – v.4 ch.12 Harvested Wood Products)

Data Description

- Source of data: FAOSTAT(fao.org/faostat) & IBGE (Brazilian Institute of Geography and Statistics – ibge.br).
- Type of data: Brazilian production in roundwood and in primary wood and paper products since 1961.
- Only the production of raw material from planted forests (basically Pinus, Corymbia and Eucalyptus genera) were considered.
- Data on primary wood products processed from logs (roundwood production) were aggregated into three categories (sawnwood, wood-based panels, and paper + cardboard) (Fig.1).

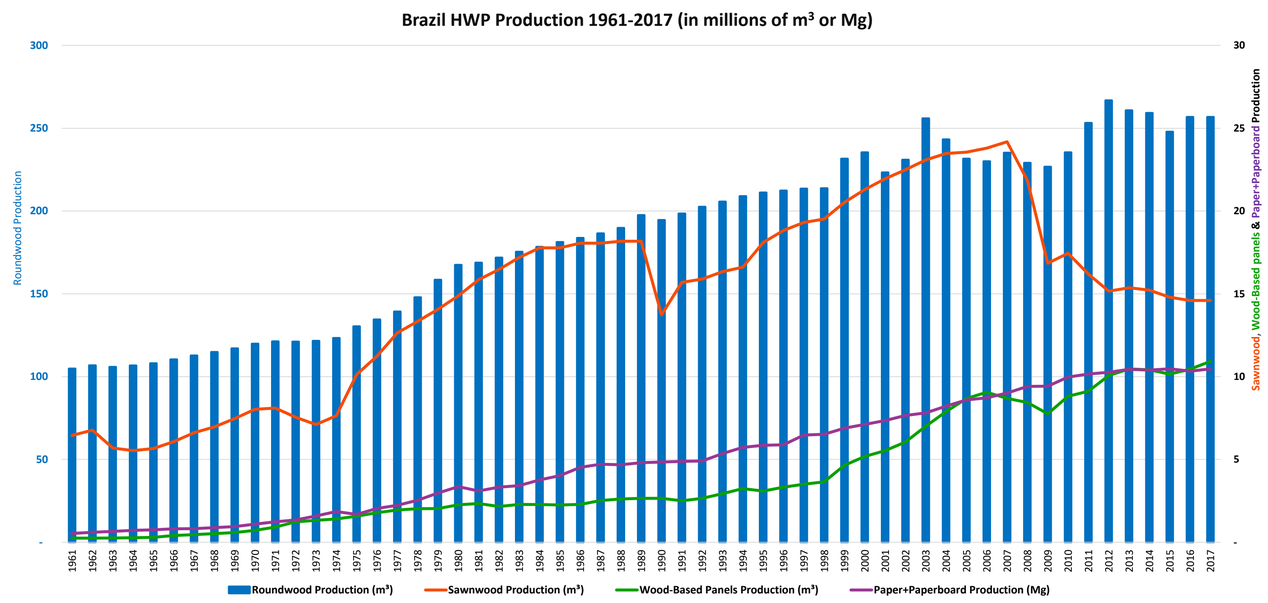

Fig.1 – Brazilian production of HWP. Source: FAOSTAT (2021); IBGE (2020).

Methods

- Use of four approaches to estimating and accounting HWP C stock size and GHG emissions:
  - Atmospheric-flow approach: net emissions/removals of C to or from the atmosphere, respectively, estimated within each country's national boundaries
  - Production approach: changes in HWP C pools are estimated to the HWP producing countries
  - Stock-change approach: changes in HWP C pools estimated in carbon stocks of HWP consuming countries
  - Simple decay approach: net emissions /removals of C to or from atmosphere, respectively, estimated and reported when but when they occur if HWP are trade.
- The variable estimates (inflow and outflow) were calculated using IPCC default factors (Tier 1), using the IPCC Model Spreadsheet.
- The half-lives used was 2 years (decay rate 0.023) and 30 years (decay rate 0.347) for solidwood products and paper products, respectively.

Results

- The contribution of HWP to AFOLU (Agriculture, Forestry and Other Land Use) was greater in the Atmospheric Flow approach with net annual removal in 2016, of 50,772 Gg of CO_2 (Fig.4).
- The estimate by the Production and Simple Decay approaches contributed with 21,349 Gg of CO_2 (Fig. 2) and the Stock Change approach was the lowest with 15,836 Gg annual (Fig.3).
- Differences in contribution (removal of CO_2) to AFOLU, in the approaches considered, are related to the values of the wood production that is exported/imported. Thus, countries with higher export values benefit from a higher carbon removal value by the atmospheric flow approach than those that have low domestic production or that are importers of forest products.

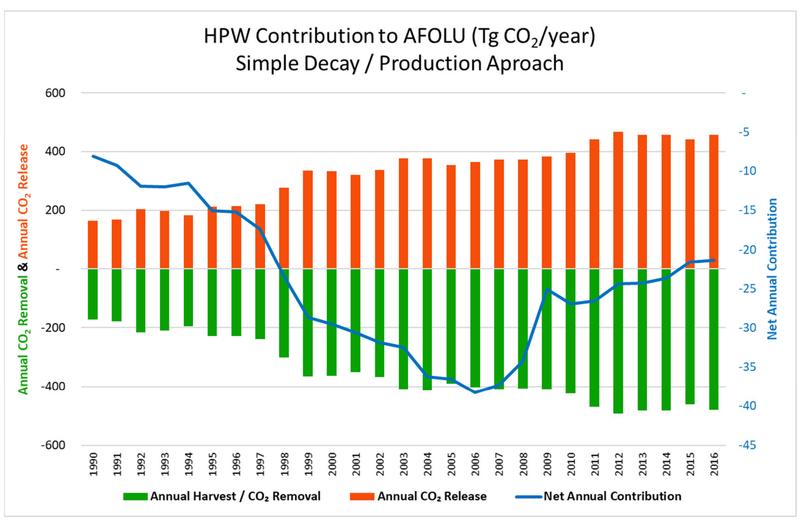

Fig.2 – Net contribution to AFOLU of Brazilian HPW – Simple Decay/Production approaches.

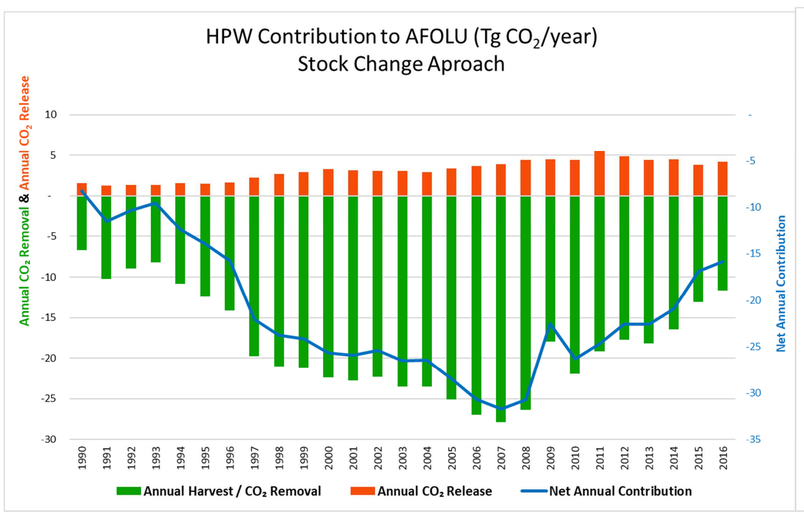

Fig.3 – Net contribution to AFOLU of Brazilian HPW – Stock Change approach.

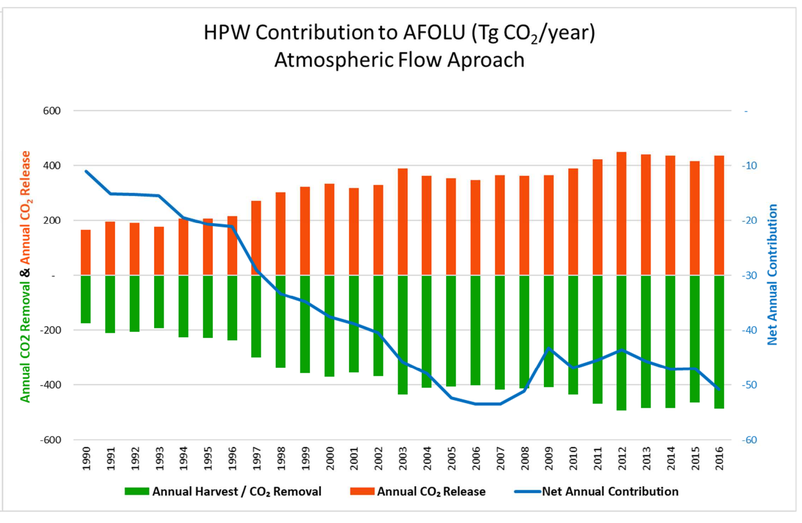

Fig.4 – Net contribution to AFOLU of Brazilian HPW – Atmospheric Flow approach.

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