

ForestOvershoot

The carbon dioxide removal (CDR) by the forest sink and the storage in wood products (hereafter 'Forest CDR') are two key elements for creating negative emissions in Germany and play a crucial role in achieving climate neutrality, especially through the provision of long-lived wood products for the construction sector. However, forests also face climate impacts that have increased dramatically recently, leading to substantial amounts of damaged timber that cannot be easily used for conventional construction products. This interaction between climate impacts on forests and their long-term mitigation potential is especially relevant in an overshooting context, where low-cost, strong Forest CDR is required later in the century to compensate for higher emissions earlier in the century, which are also likely to be accompanied by stronger extreme events affecting forests. Projections of the German forest sink and harvested wood product (HWP) carbon storage are required that capture these intricate interactions and can provide an uncertainty range for future Forest CDR projections. Therefore, the aim of ForestOvershoot is to evaluate and quantify the potential for and timing of Forest CDR options in Germany under an overshoot scenario, while accounting for uncertainties arising from climate change, forest disturbances, and other forest management objectives.

To achieve its aim, ForestOvershoot employs state-of-the-art forest and wood product modeling (e.g. LandscapedDNDC, FABIO, 4C, LPJ-GUESS), life-cycle analysis (LCA) as well as carbon cycle assessments of innovative timber buildings relying on a wide range of data sources and expert knowledge to quantify the negative emissions generated by Forest CDR under a range of forest disturbances, forest management, forest protection, forest conversion and use-of-innovative- HWP-in-construction scenarios in an overshooting context (i.e. employing the latest CMIP6-based overshooting scenarios SSP5-3.4). The forest models use harmonized input data, model setups and scenarios so that they can be compared, ensembles can be calculated, and uncertainties related to model processes can be assessed. Moreover, trade-offs between Forest CDR and key ecosystem services and biodiversity are simulated, and ForestOvershoot uses multi-criteria optimization techniques to quantify them. Trade-offs are particularly evident in an overshooting context, where strong climate impacts on forests are expected, and the need for long-lived HWPs to generate additional negative emissions is increasing. The simulations underlying the historical and future multi-model projections of Forest CDR will be post-processed to align with the official German national GHG reporting standards, enabling reporting agencies to include them in their national assessment and projection reports and in contributions to the next UNFCCC Global Stocktake in 2028. The project results are further channelled into concrete policy recommendations for proactive planning and management of Forest CDR, as well as into scientific publications that contribute to the IPCC Seventh Assessment Report's knowledge base.