

Supplementary Material

Fig. S1 - Distribution and proportion of land that contains TOF by tropical subregion (adapted from ESA 2017).

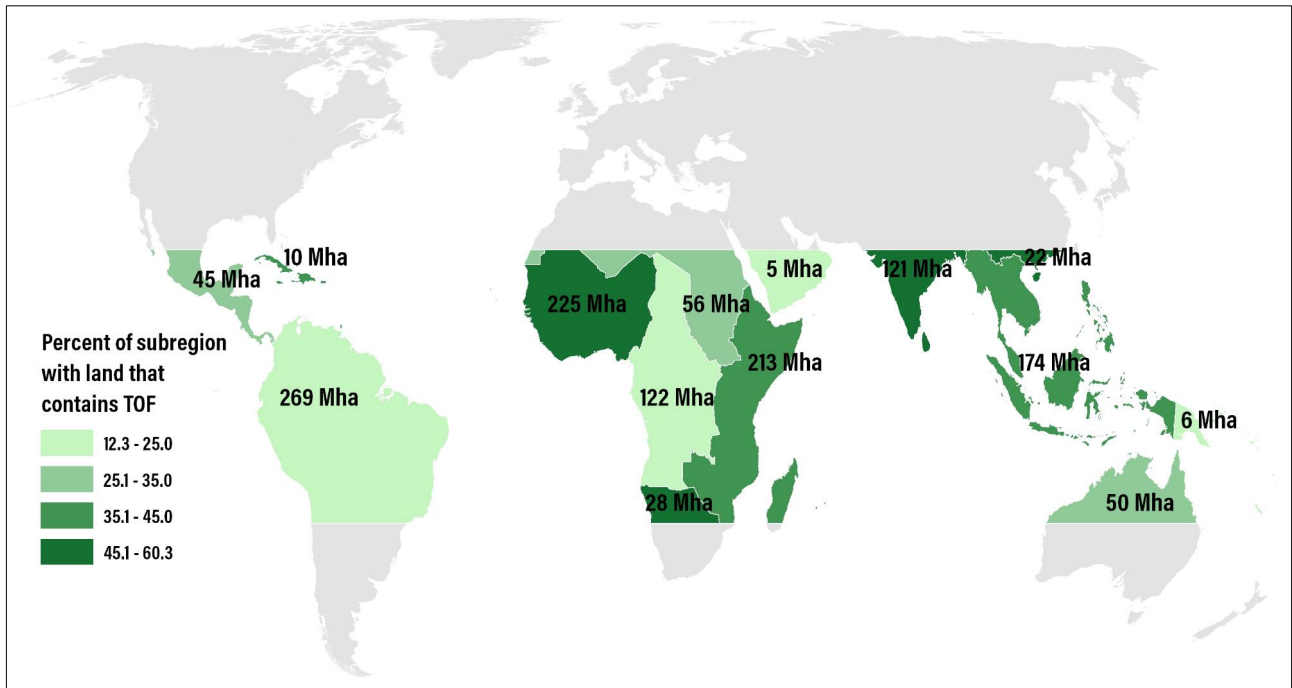
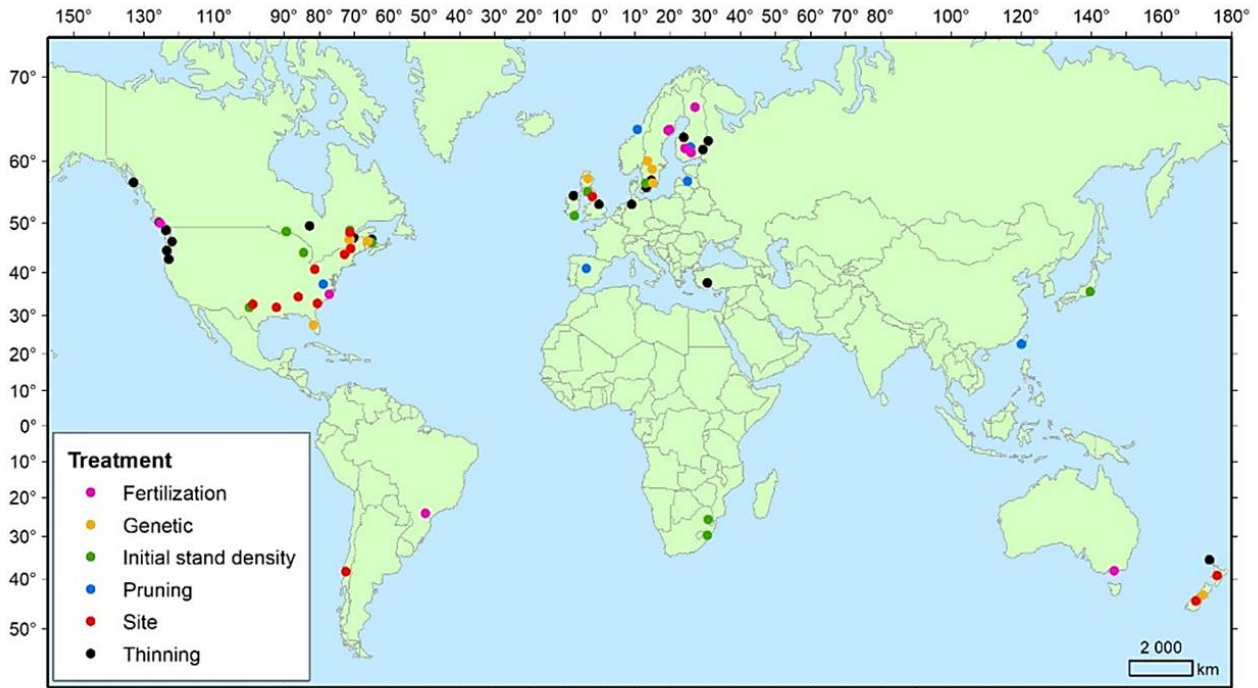


Fig. S2 - Geographic location combined with the different silvicultural treatments of the different planted forest areas studied in this review paper (adapted from Barrette et al. 2023).



Appendix 1 - Cases studies.

Improving forest productivity through improved silvicultural practices: the example of the Makala Project in the Democratic Republic of Congo and in Republic of Congo

In the Democratic Republic of the Congo, a major part of domestic energy comes from wood. Urban sprawl takes a hard toll on natural peri-urban forests. The Makala (“charcoal” in lingala) Project implemented from 2009 to 2013 under the coordination of the French agricultural research and cooperation organization CIRAD, was designed to address the degradation of wood resources while meeting energy needs in the cities of Kinshasa and Kisangani, Democratic Republic of the Congo, and Brazzaville, Congo. Building on lessons learned from pre-existing high productivity plantations, the project contributed to increasing wood resources through planted forests. It adapted technical itineraries for planted forests, with the priority objective of sustainable production of wood for energy purposes; supported the establishment and management of woodfuel plantations by small private growers and communities; and integrated planted forests for energy purposes into an agroforestry dynamic (Peltier et al. 2014). In areas of second-growth forest where biodiversity was still high, the project favoured assisted natural regeneration to protect species useful to farmers (Peltier et al. 2014). In contrast, in the most degraded areas where only invasive grasses or shrubs remained, planting fast-growing leguminous trees was the most appropriate solution for restoring soil fertility, while producing woodfuel and non-timber forest products (Bisiaux et al. 2009).

Expanding the area of planted forests thanks to small-scale commercial forestry: The Ugandan Sawlog Production Grant Scheme (SPGS)

Initiated in 1998, Ugandan forest sector reforms introduced a policy emphasizing the private sector's pivotal role in developing and managing commercial forest plantations to meet the growing nation's demand for timber, alongside government efforts to foster a conducive investment environment. Despite incentives outlined in the 1991 Uganda Investment Code and its 1997 amendment, investment in commercial forestry remained subdued, primarily due to mismatched investment cycles and the absence of provisions for long-term financing by the banking sector. To address these gaps, the Government of Uganda through the Ministry of Water and Environment (MWE) established the Sawlog Production Grant Scheme (SPGS) in 2004 with funding by the EU and the Governments of Norway and Uganda. After 20 years of operation, the SPGS stands out as a flagship forestry project in Uganda and the rest of sub-Saharan Africa, demonstrating good practice

regarding how to justify, plan for and implement an incentive-based, community tree-planting scheme. The SPGS functions as a public–private partnership to encourage mostly small- and medium-scale landholders to grow trees commercially for timber, poles and woodfuel. Investors are attracted by the SPGS incentives financial and technical package and by the availability of long-term tree-planting permits on government land. The SPGS model takes a holistic approach to commercial forestry, whereby small-, medium- and large-scale landowners in the community are all involved. The small-scale community and woodlot planters were a source of skilled labour to the medium- and large-scale growers, which created a sense of ownership and reduced community-induced risks and threats to plantation forestry. In addition, the small-scale growers adopted improved practices and standards, and marketed their products more effectively through the large-scale planters, who had established national, regional and international timber market networks. Overall, the SPGS grants have supported direct plantation establishment and maintenance of close to 70 percent of the planted forest resource in Uganda, estimated at 105 000 ha to date ([Howard 2019](#)). Across three project phases spanning from 2004 to 2021, a total plantation area of 71,000 hectares was achieved, with 11,000 hectares in Phase I (2004-2009), 32,000 hectares in Phase II (2009-2015), and 28,000 hectares in Phase III (2016-2021). These were largely monoculture plantations, which excluded taungya practices, except at community level (0.5–5 ha). Close to 80 percent of the SPGS-supported plantation area was established in degraded gazetted central forest reserves, which has contributed to increasing the national forest cover to 15 percent in 2023, according to the National Forestry Authority (NFA, 2023). Approximately 44 000 ha of forest in Uganda are FSC-certified for economic, environmental and social sustainability, and 75 percent of this area belongs to SPGS-affiliated growers. Since its launch in 2004 and until its end in 2021, the SPGS has created over 12 000 jobs in plantation management, nurseries, forest contracting and other support services ([SPGS 2021](#)). In addition, the project has ensured sustainability of actions by the private sector through establishment of the Uganda Timber Growers Association (UTGA) in 2006. UTGA is a tree growers members' organization. Currently, UTGA has 670 members and holds a Forest Stewardship Council (FSC) group certification. These remarkable achievements resulted in close to 20 years of funding by the European Union, and additional funding from the World Bank under the Investing in Forests and Protected Areas for Climate-Smart Development (IFPA-CD) project, which is expected to contribute an additional 36 500 ha of commercial plantations in the country over 2022–2026.

Large-scale afforestation and reforestation efforts in China

Over the past 40 years, China has experienced a dramatic forest area increase, due to the implementation of large-scale afforestation programmes (FAO 2020a). From 1978 to 2015, China's programmes, designed to restore or enhance ecosystem services, ranging from erosion control and watershed protection to cropland protection, desertification control, landscape amenity and carbon sequestration, were initiated (FAO 2020b). These include for example the "Three-North Shelterbelt Development Programme" established in 1979, the Sloping Land Conservation Programme established in 1998, the Natural Forest Conservation Programme established in 1998, the Fast-Growing and High-Yielding Timber Programme running from 2001 to 2015, or the Beijing-Tainjin Sandstorm Source Control Programme established in 2001. The massive reforestation programme resulted in a drastic increase in forest coverage and stock. Most of China's new forests are monocultures of fast-growing species considered to have high economic potential, such as eucalypts, poplars, larch and pines (FAO 2021). Not all the new forests have established successfully, however and important challenges remain, including for example forest resource quantity and quality, logging policy (Ke et al. 2019), poor soil stability and a high vulnerability to pests and diseases, and low biodiversity (FAO 2021).

Integrating trees in agricultural systems: the PREFOREST/PROREP initiative in the Republic of Congo

With the aim of reducing greenhouse gas emissions, the "Project to reduce greenhouse gas emissions from forests in five departments in the Republic of Congo" (PREFOREST) plans to establish 14,500 ha of forest and agroforestry plantations and 5,000 ha of assisted natural regeneration (ANR) in 5 departments of the Republic of Congo. PREFOREST is funded by the Green Climate Fund (GCF) and implemented jointly by FAO and the Ministry of Forest Economy (MEF). PREFOREST is co-financed by the "Projet de renforcement du potentiel en bois énergie durable en République du Congo" (PROREP) funded by the Central Africa Forest Initiative (CAFI). PREFOREST/PROREP initiative proposes a holistic approach to sustainably address the main driver of deforestation in southern Congo: slash-and-burn agriculture for agriculture expansion and unsustainable production of fuelwood. This holistic approach is based on the underlying theory that if (i) tenure access and tenure rights are secured; (ii) low-emission climate-resilient agroforestry and forestry systems are adopted; and (iii) access to finance and markets for agroforestry and forestry is

enhanced, then deforestation and forest degradation and associated GHG emissions from slash-and-burn agriculture caused by agricultural expansion and fuelwood production will be reduced and ultimately halted. PREFOREST/PROREP was launched in 2022 and started with key activities to build the foundation of the project:

- Participatory mapping has been completed in 7 districts and is in the process of being completed in 6 additional districts. Participatory mapping will enable the identification of lands suitable for agroforestry and Assisted Natural Regeneration (ANR). Identification of lands is made ensuring their Free, Prior and Informed Consent (FPIC) of beneficiaries. Setting up a complaints management mechanism is also part of this inclusive approach (Project Grievance Redress Mechanism - PGRM).
- Training of trainers on Rural-Invest, a toolkit to support the development of business plan, has been organized to create a pool of experts in Congo. These experts will support our beneficiaries to explore how to create a business concept, a yearly cost-benefit analysis that optimizes the investment and the chance of success.
- The planting of trees for wood energy production over short rotating cycles (7-8 years) using the Mampu system has been a major focus for the project. 472 ha in the districts of Ignié and Ngo has been planted as per implementation plan with the co-financing from the project (CAFI).

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