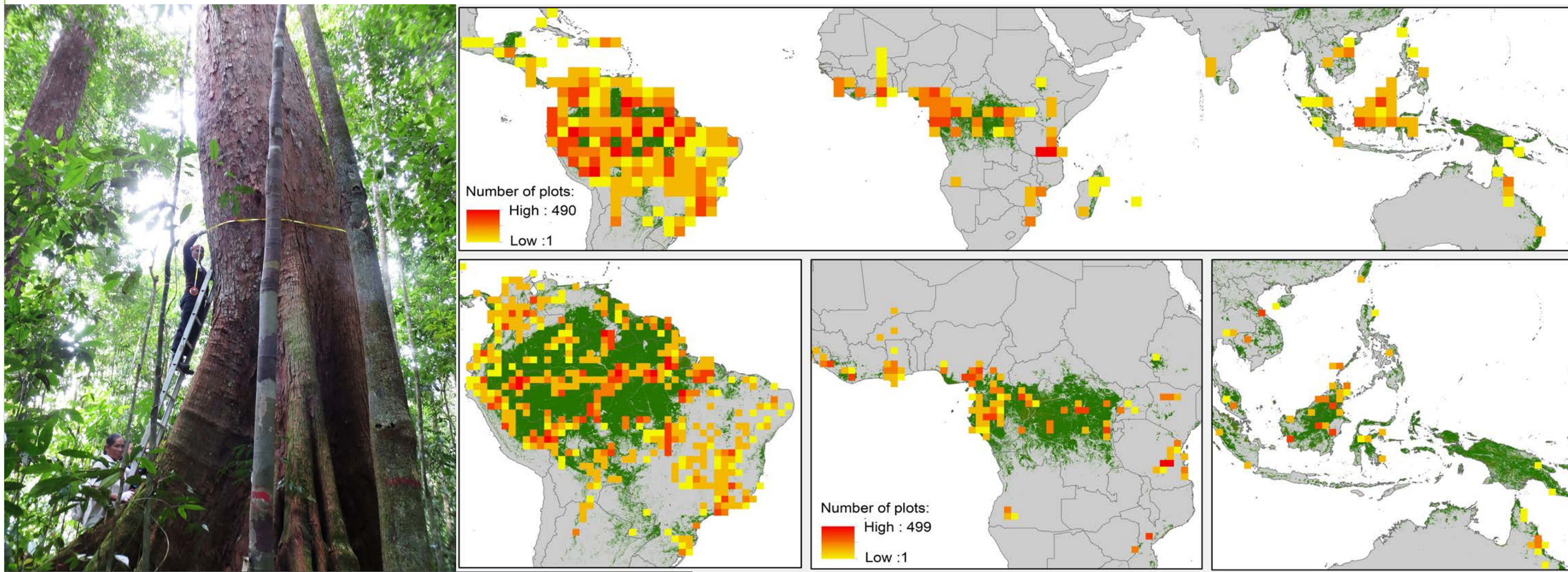


Tropical forests – Earth's most precious ecosystems – are changing as never before. Meanwhile, careful, long-term measurements are essential to know how, where and why. What if we could unite researchers across the world to understand the ecology of forests, their sensitivity to climate change and how they help to slow it?

ForestPlots.net's mission is to support and connect researchers measuring tropical forests, and to create a shared, scientific picture of their health. This worldwide collaboration is transforming our understanding of tropical forests and their shifting dynamics and is informing policy on their protection and management.

IMPORTANCE

Accurate forest measurements demonstrating the importance of forests to the planet's carbon balance are extremely hard won and involve thousands of scientists tracking the lives of millions of trees from thousands of forest plots from across the globe, over many years. Tree species, carbon and soils are hard to monitor from space, so fieldwork is essential for validating estimates obtained from satellite images (Chave et al 2019). ForestPlots.net brings together ground measurements of tropical forests from over **2,500 colleagues across 62 countries**. This huge collaboration has revolutionised understanding of tropical forests, and how they respond to and affect climate change.



T-Forces researchers preparing to measure a giant tree in Borneo.

TOP: Pantropical plot sampling density per 2.5 degree square with the 6500 multiple- and single-inventory plots hosted at ForestPlots.net. These contribute to 24 networks including RAINFOR, AfriTRON, T-FORCES, ATDN, BIOTA, COL-TREE, FATE, GEM, Nordeste, PELD, PPBio, RAS, RBA and SECO.
BOTTOM: The same sampling but at higher-resolution (1-degree grid cells) for South America, Africa, and Southeast Asia and Australia.

MEASURING

By using standardised field protocols and quality assured data input, measurements from teams across the world can be meaningfully compared, creating a unique global record of forest characteristics (ForestPlots.net et al. 2021). The plots, usually 1 ha each, are remeasured every few years, to observe changes over time and to build a picture of where, how and why forests are changing.

Typical measurements include: **Tree-by-tree biomass; growth and death; species identification; soil characteristics; plant traits.**

The resulting database provides a treasure-trove of information about many of Earth's most precious ecosystems.

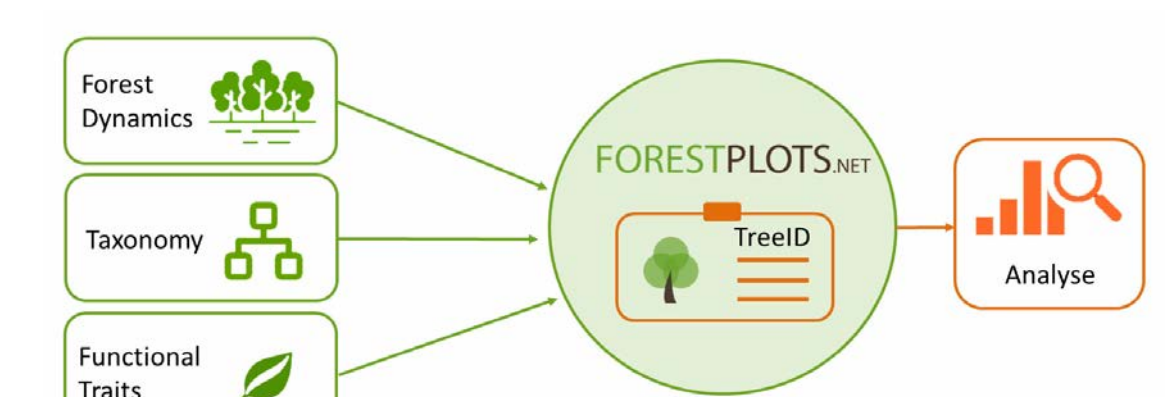


ForestPlots.net supports students in the tropics, fosters collaboration and encourages research led by scientists in the global South.

THE TECHNOLOGY

ForestPlots.net supplies ecological informatics to colleagues in scientist-led networks.

Key advances in this platform include the ability to **upload and manage complex time-series data**, track **species** linked to high-quality **botanical records**, and analyse records with **BiomasaFP R-language** protocols.



Integrating data facilitates analysis and expands the potential of questions that can be answered.

CONNECTING



Field team preparing the collected herbarium specimens, Parque Nacional Yanachaga Chemillen, Peru.

A Global Collaboration

By linking tropical researchers together and valuing the key role of data originators in scientific discovery, our **Social Research Network** model seeks to support and empower the key workers who make 21st century big data science possible (ForestPlots.net et al 2021).

DISCOVERING

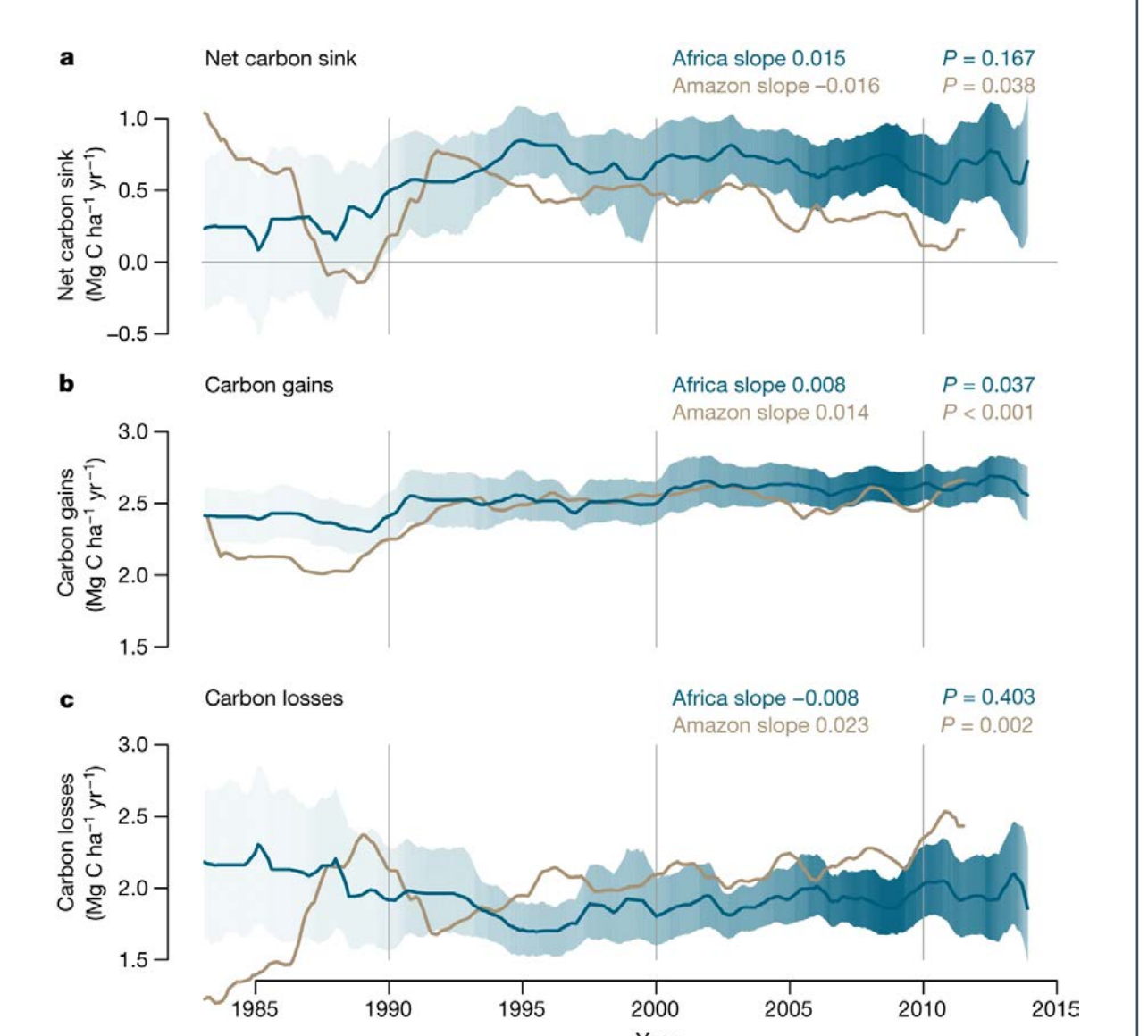
The data curated in ForestPlots come from the hard work of 1000's of researchers and participating networks who together have shown that **long-term monitoring of forests on-the-ground is irreplaceable.**

THE PAN-TROPICAL FOREST CARBON SINK

Long-term plot measurements show that old-growth tropical forests have provided a huge carbon sink (Brienen et al 2015, Qie et al 2017, Hubau et al 2020), revealing that one billion tonnes of carbon (half the terrestrial global carbon sink (Pan et al 2011)) were sequestered by tropical forests annually in the 1990s and 2000s, sufficient to slow climate change.

The rate of increased growth is now slowing (Brienen et al 2015) and may reach a limit, potentially causing some forests to lose carbon as temperatures rise (Hubau et al 2020, Sullivan et al 2020). Furthermore, recent droughts, such as those in 2005 and 2010, temporarily reduced the Amazon carbon store, by killing trees and emitting 1.2-1.5 billion tonnes of carbon (Phillips et al 2009). Forest biodiversity is changing too, with more drought-sensitive tree species declining (Esquivel et al 2019).

This saturation of the tropical forest carbon sink has consequences for policies intended to stabilize Earth's climate. Can we rely on tropical forests to keep on helping us? **One thing is for sure – if we don't look, we won't know. ForestPlots.net is bringing communities together to support sustainable, equitable and reliable long-term monitoring of Earth's most critical ecosystems.**



Long-term carbon dynamics of structurally intact old growth tropical forests in Africa and Amazonia (Hubau et al. 2020)

IMPACTING

Informing Policy and Changing Science, for example:

COP-26: Our international collaboration has provided evidence to support policy on enabling nature to help tackle the climate crisis, such as the pledge at COP-26 by 140 world leaders to end deforestation by 2030, which recognises the contribution of tropical forests to removing carbon from the atmosphere (U.K. Government 2 November 2021)

Peru: ForestPlots.net was a vital partner supporting Peru's government submission to the UNFCCC in 2021 and our plot networks are part of Peru's official Nationally Determined Contribution (NDC) to help monitor, understand and mitigate the impact of climate change on Peru's forests.



References

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