



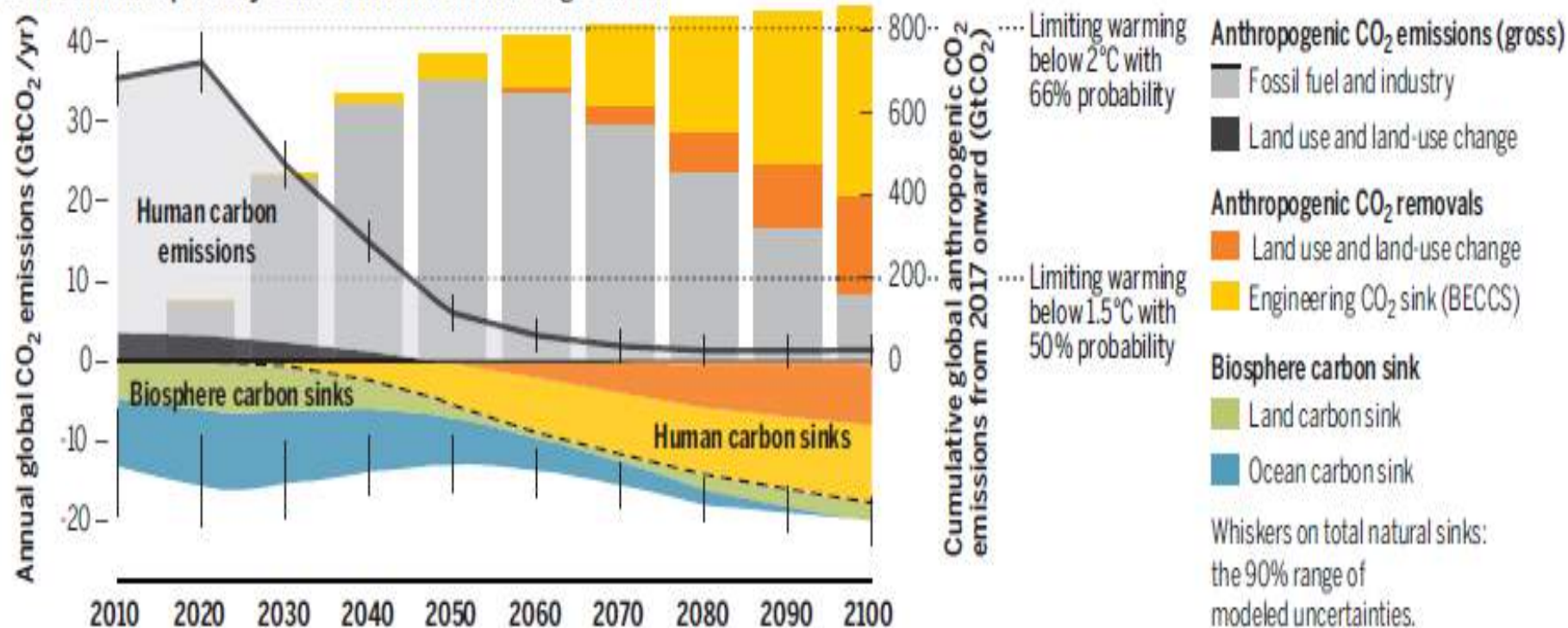
Forest products and efficient resource use as climate mitigation and adaptation strategies

COPPE / UFRJ

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Increase Carbon Sink

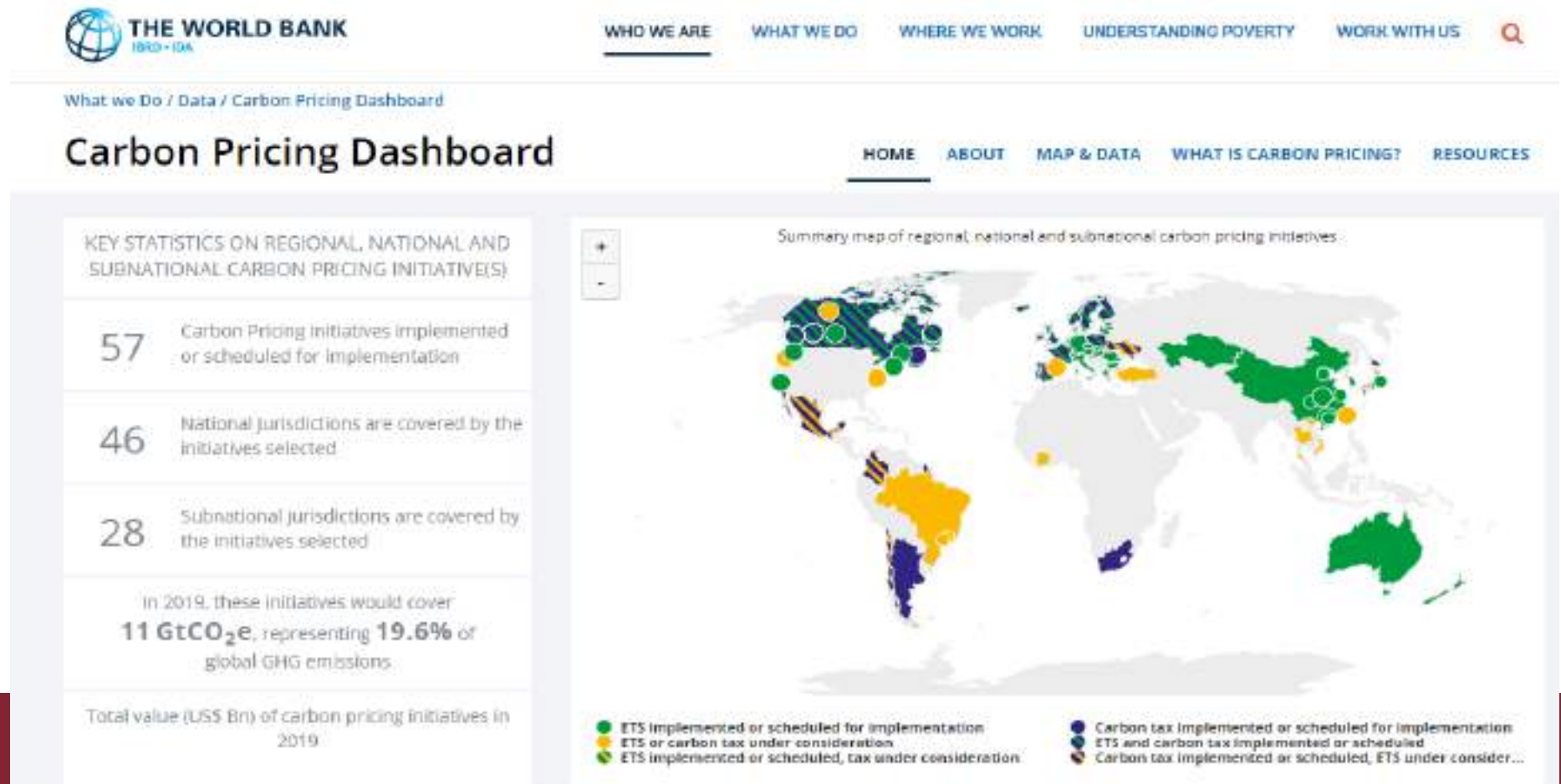
Decarbonization pathway consistent with the Paris agreement



Economic Tools for Mitigating the Effects of Climate Change

- Carbon Pricing
- Subsidies
- Standards and certifications
- Taxations
- Emissions Trading
- Regulations

Carbon pricing is considered a “logical foundation for any police regime for low carbon development” (World Economic Forum).



CANADA

Current prices per metric ton of CO ₂	Share of emissions covered per province
\$15-\$30	47%-90%

BRITAIN

Current price per metric ton of CO ₂	Share of emissions covered
\$25	23%

AUSTRALIA

Current price per metric ton of CO ₂	Share of emissions covered
\$10	Minimal

A number of key industries that face international trade competition, like steel and chemicals, are exempt from Canada's tax. Instead, they participate in [a separate program](#) in which the dirtiest companies within each sector either have to pay the government for excess emissions or buy carbon credits awarded to the cleanest companies.

UNITED STATES

9 Northeastern states

Current price per metric ton of CO ₂	Share of emissions covered
\$5	18%

California

Current price per metric ton of CO ₂	Share of emissions covered
\$15	85%

There are some signs that carbon pricing [could expand further in the states](#). Virginia and New Jersey are making moves to join the Regional Greenhouse Gas Initiative, and several Northeastern states are planning a similar program for cars and trucks that would put a price on transportation fuels and invest in mass transit, electric buses or other low-carbon solutions.

The Bamboo Carbon Cycle

Above-Ground

- CO₂ sequestrations by photosynthesis
- Carbon in harvested products
- Carbon in standing biomass

- O₂ release
- CO₂ release due to decomposition of dead organic matter



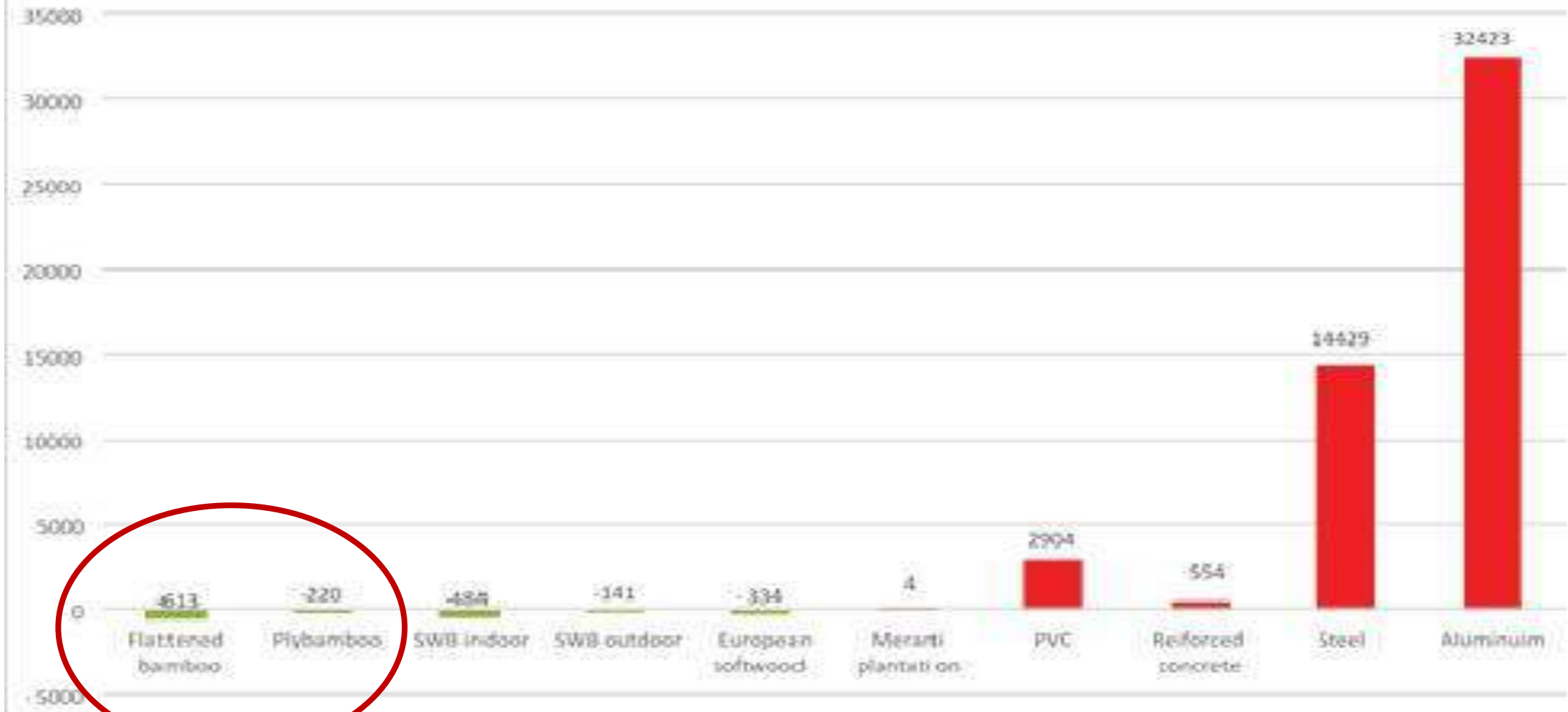
Below-Ground

- Long-term CO₂ sequestration in soil
- Carbon in below-ground biomass (rhizome and root systems) which survives selective harvest

- CO₂ release due to soil respiration



Carbon footprint over life cycle (CO₂eq/m³)



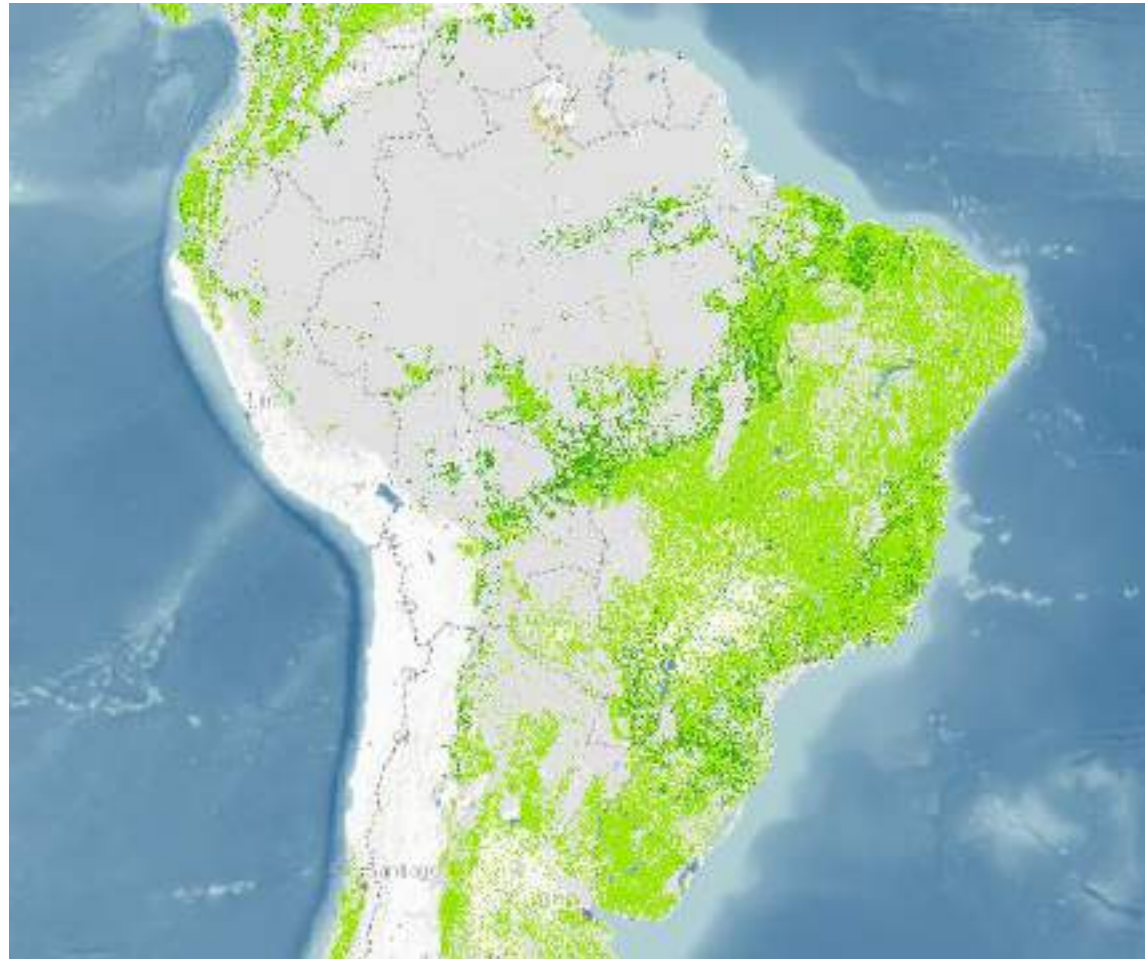
Increase Carbon Sink

BAMBOO CARBON DIOXIDE CAPTURE COMPARATIVE - TREE

FOREST	CO2 TREATMENT Ha/year	CO2 KILOS CAPTURED BY SITE
GIANT BAMBOOS	78.5	282.6
FAST GROWTH TREES	13.4	16.7
SLOW GROWTH TREES	2.6	6.5

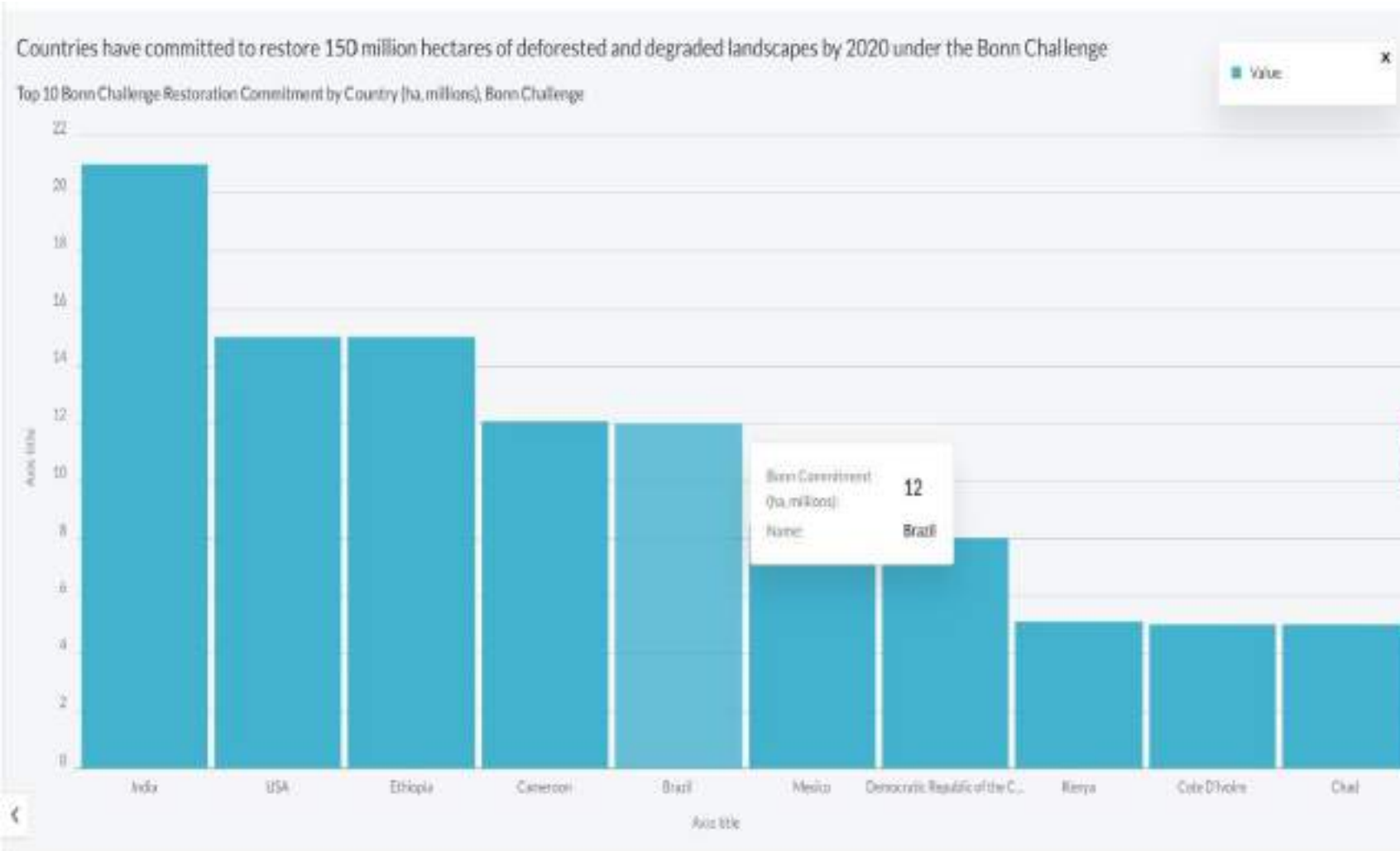
NOTE: A car throws 5 tons of carbon dioxide per year

Restoration opportunity areas



- Wide-scale restoration
- Mosaic restoration
- Remote restoration
- Forest without restoration needs

Increase Carbon Sink



Restore 12 million hectares of forests, as well as achieve an estimated 45% share of renewable energy in the energy matrix composition by 2030.;

Moreover, bamboo can be planted in areas where farming is not feasible, e.g, by rehabilitating degraded land including eroded slopes and re-establishing functioning and productive ecosystems by improving soil quality and restoring the water table

BAMBOO - CARBON BONUS PRODUCTION

- Carbon fixed per Ha/year: 21.41 Ton
- Carbon dioxide captured from the atmosphere per Ha/year: 78.5 Ton
- Value of the ton of carbon dioxide captured: USD 7
- Income per Ha/year: USD 549,50

BAMBOO – THE MARKET IN THE WORLD

68.8 billions dollars/ year

Asia pacific countries (60% of the market) =

41.2 billions dollar

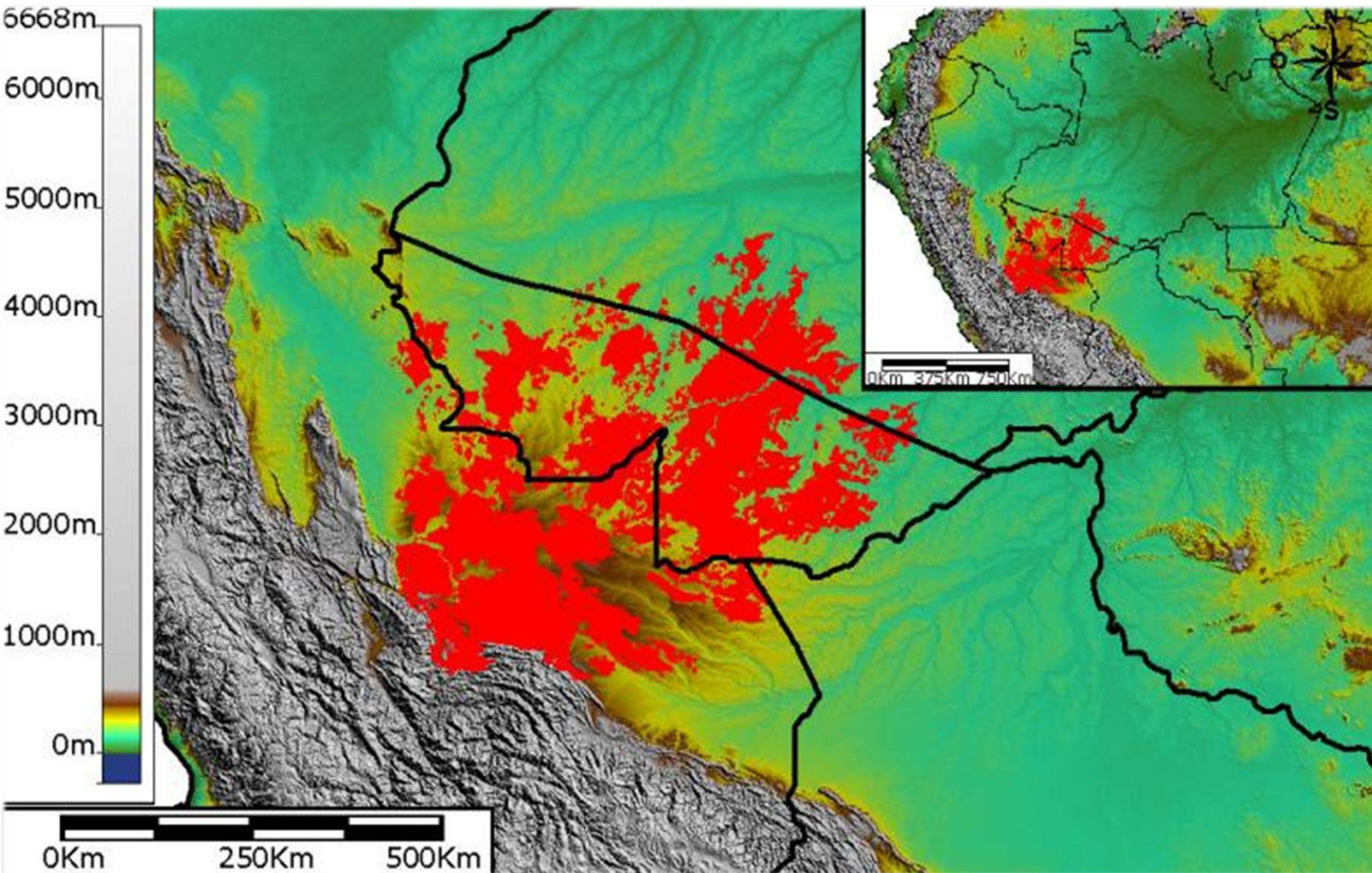
China = 31.2 billions dollars

Bamboo benefits Sustainable Development Goals

Bamboo adds value to climate change mitigation and adaptation.

- **SDG7:** Ensure access to affordable, sustainable, and reliable modern energy services for all;
- **SDG13:** Promote actions at all levels to address climate change;
- **SDG15:** Protect and restore terrestrial ecosystems and halt all biodiversity loss, especially which calls for restoration of degraded ecosystems by 2030, which aims to increase forest cover and which calls for integration of natural resources into planning and development processes.

- Brazil is the country with the **greatest bamboo diversity and the highest percentage of endemic woody bamboos in Latin America.**
- National Policy to Support Sustainable Management and Bamboo Cultivation (BRASIL, 2011):
 - Promotes sustainable management of native forests and commercial cultivation;
 - Offers incentives for family farming;
 - Aims to boost research on Brazil's native bamboo and provide its technological development.
- Bamboo can be a solution for the industries of the Brazilian economy, with enormous potential of use in the sectors of paper and cellulose, construction, furniture, lamination, coal, among others.



Area: 160.000 – 180.000 km² – forming a biome the size of all of the primary and secondary forests in Central America combined

This area, largely composed of two bamboo species and comprises a significant portion of the Amazon Basin

BAMBOO - Acre

- Acre has the **largest** bamboo forest in the world.
- The state's principal forest types are tropical dense forests and bamboo forests with high floristic heterogeneity, which are considered to hold **great economic value** (Government of Acre 2013).
- Bamboo has been used in environmental conservation and as an instrument capable of **reducing social inequalities, increasing in income** (SEBRAE/ AC, 2018).
- Bamboo is a promising crop with many possibilities (EMBRAPA/ AC, 2018).

BAMBOO - Brazil

- National Policy to Encourage Sustained Management and Bamboo Cultivation - Law n° 12.484 (2011);
- High potential for commercial cultivation;
- High potential to develop industrialized products for domestic and international markets.
- Cleaner energy matrix and favorable location to export both through the ports of the Atlantic eastern coast and through the west coast using the ports of Peru through the interoceanic highway.



Coppe's biomass laboratory



Bamboo Bioconcrete

Sustainable technology for Bamboo management in the Amazonian Region

- Development of new building materials
- Quantification of carbon storage benefit – LCA
- Socio-economic benefit of new building materials
- Pilot regenerative project
- Scaling up the business model
- Capacity Building in : Education, Innovation and Technology

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