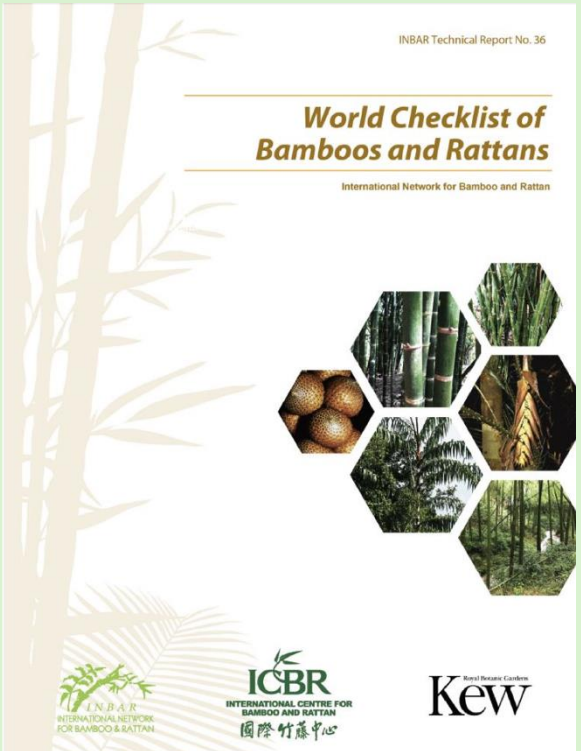
Growing Timber Bamboo for Architects, What you need to know

Susanne Lucas

WORLD BAMBOO

According to the World Checklist of Bamboo and Rattan (2017), there are 1,642 accepted species of bamboos: 1,521 woody bamboos and 121 herbaceous bamboos



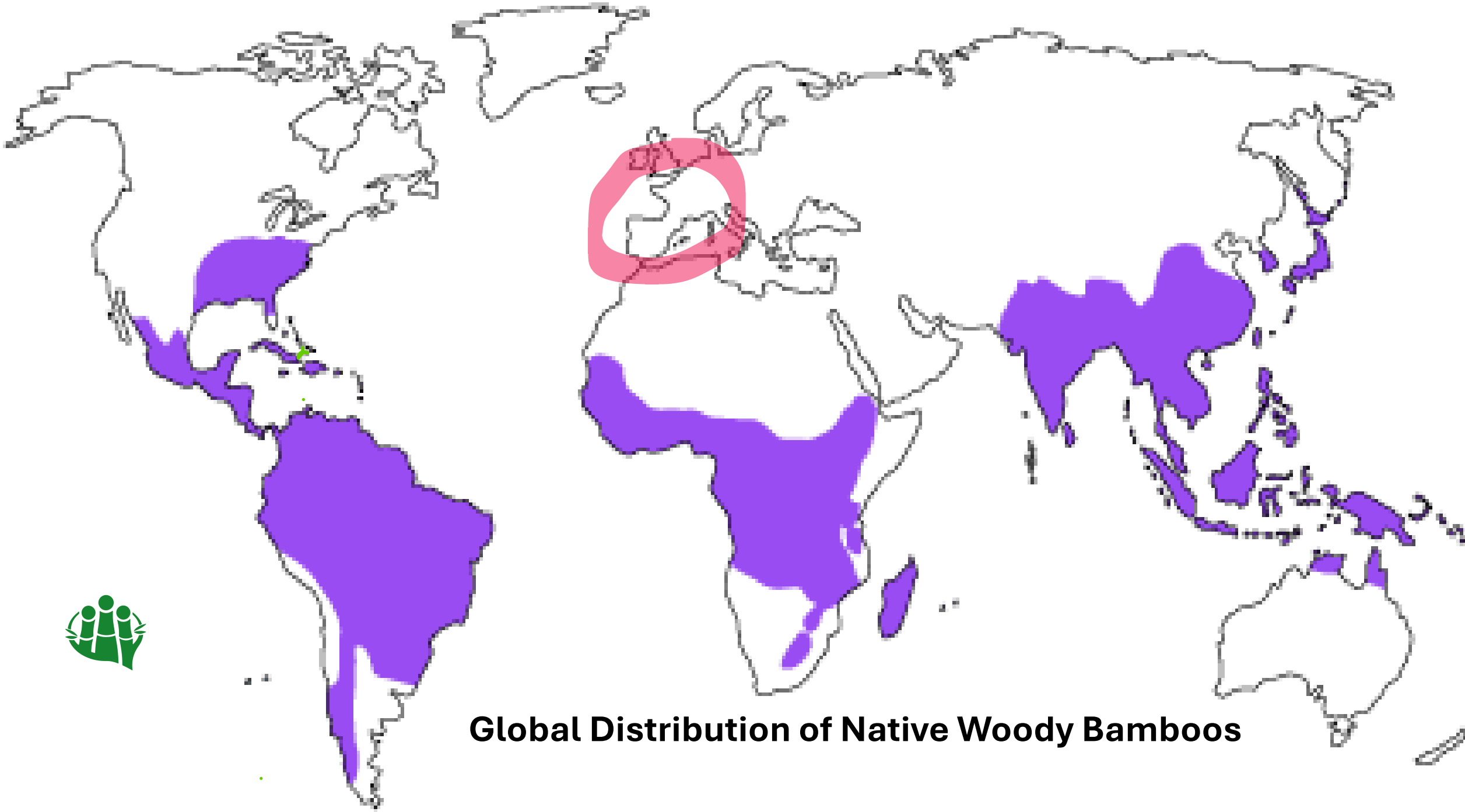
Many of these are rare, occurring in very sensitive ecosystems, and many are listed on the IUCN Red List of Threatened Species.

Chusquea sp. in Brazil

Glaziophyton in Brazil

There are still many bamboos yet to be discovered, or yet to be assigned a valid name.

WORLD BAMBOO

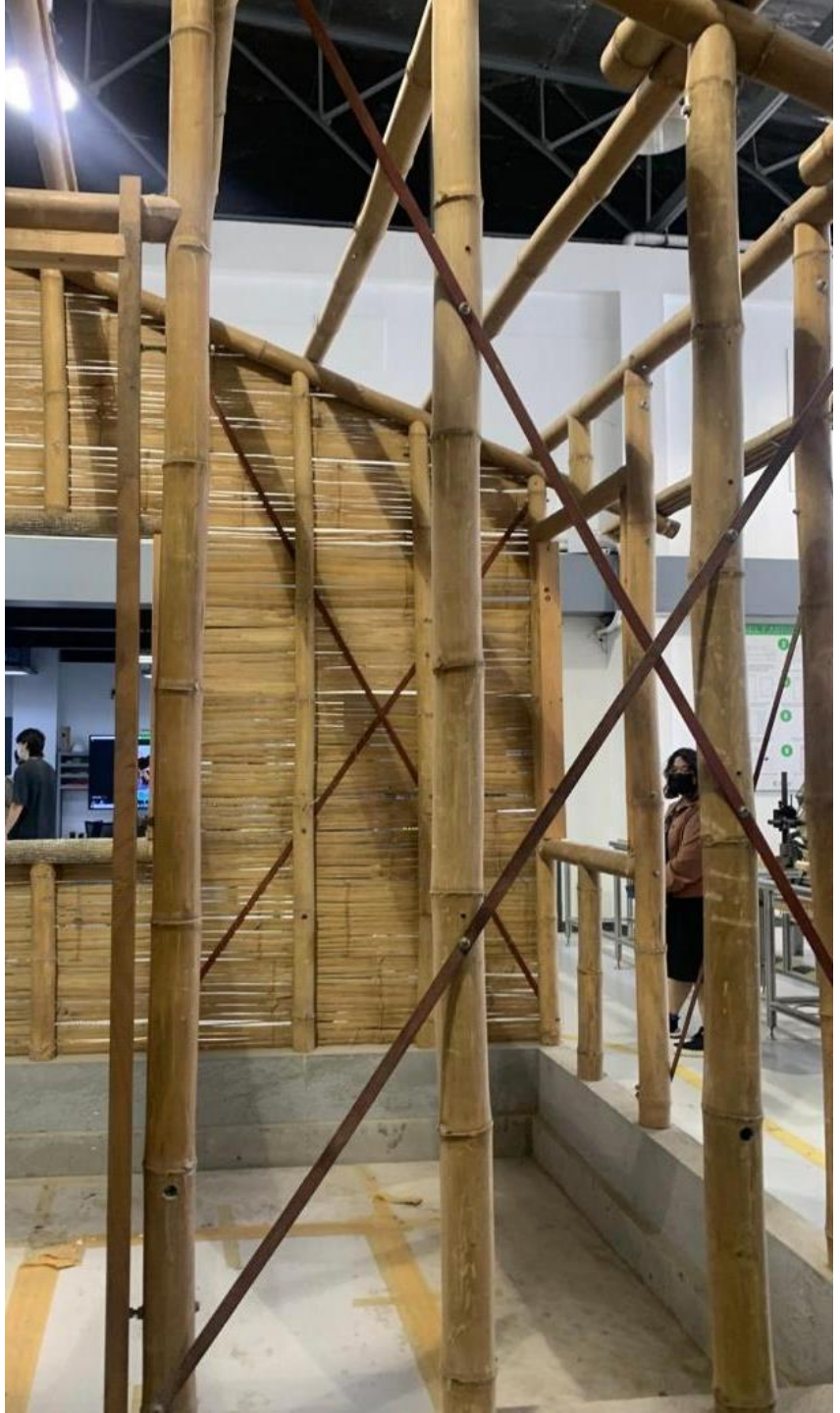


Global Distribution of Native Woody Bamboos

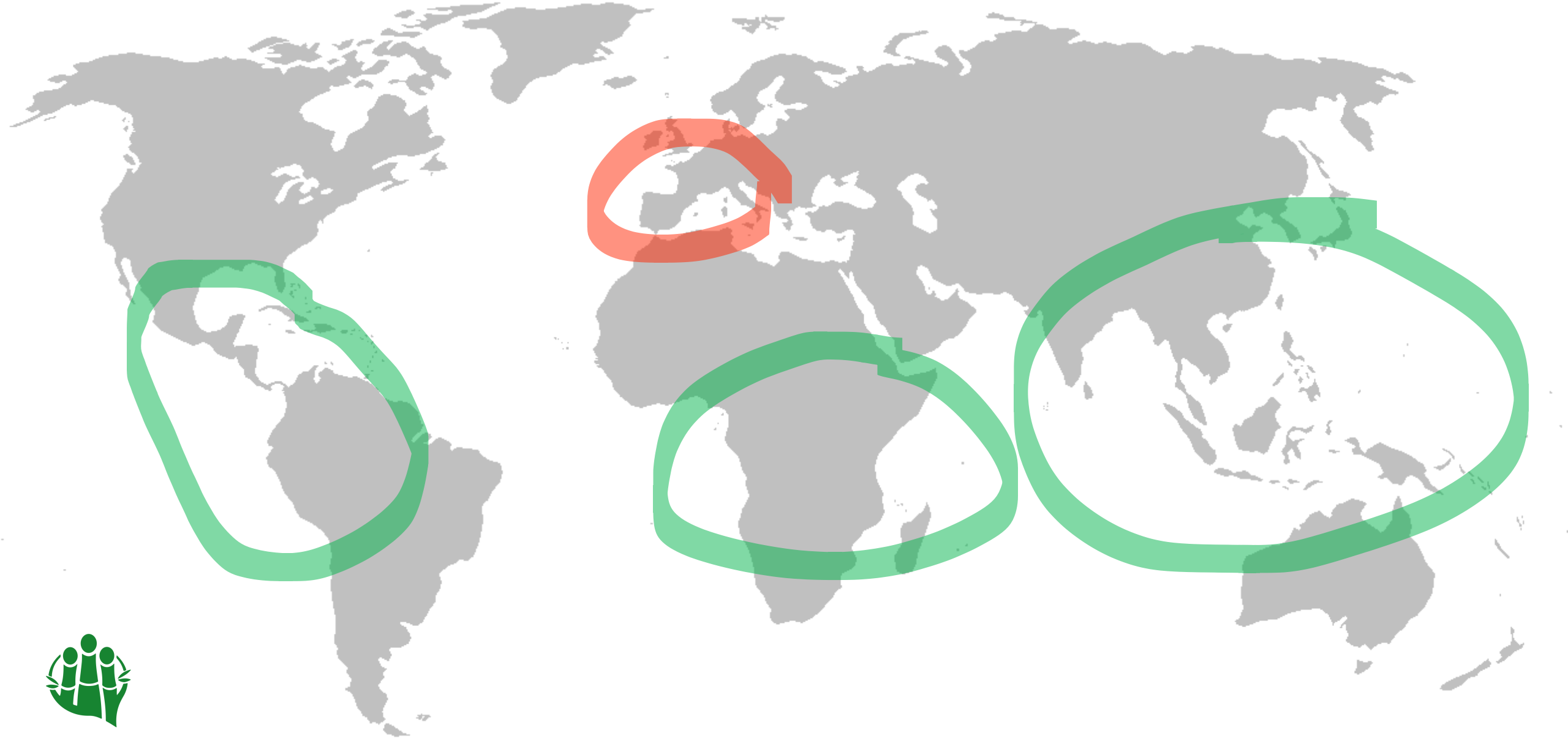
Why should you, as architects and builders, care about bamboo?

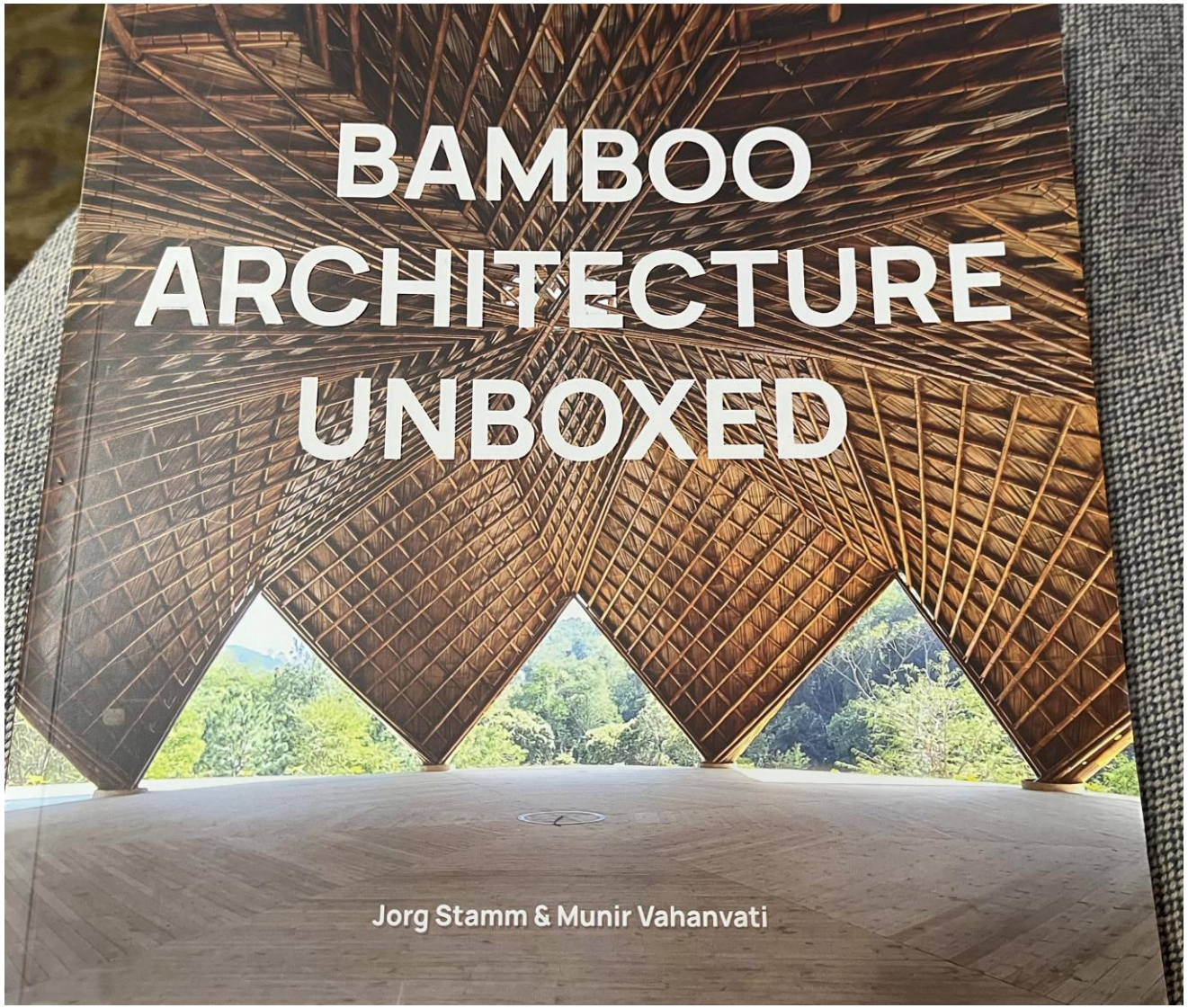
Bamboo offers a fast-growing, adaptable, sustainable alternative that provides environmental benefits during growth and when utilized provides long-term carbon storage alongside other bio-based building materials to provide solutions to climate change in a new-era construction.

There are more benefits too – improving rural economies, for example

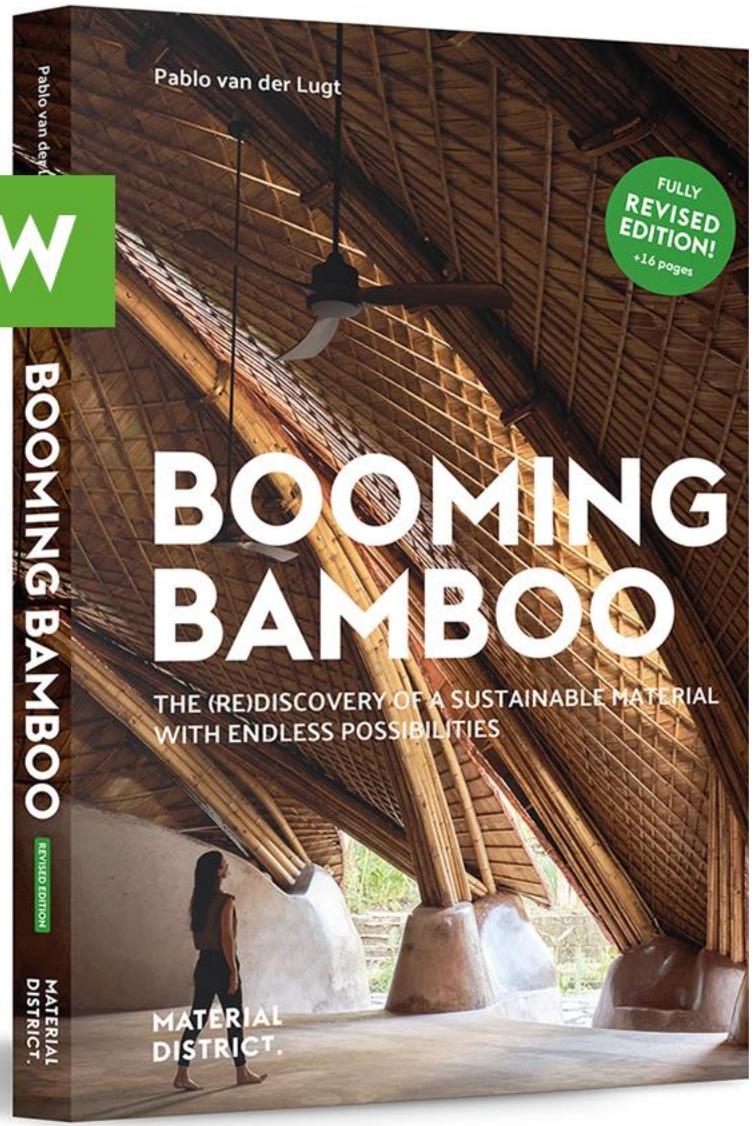


The first bamboo bridge in Holland, 2003? With *Guadua* from Colombia supplied by Charley Younge (BIC) and engineered by Pim De Blaey of Grontmij (Sweco)




BAMBOO
ARCHITECTURE
UNBOXED
Jorg Stamm & Munir Vahanvati

NEW


Pablo van der Lugt
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BOOMING BAMBOO
THE (RE)DISCOVERY OF A SUSTAINABLE MATERIAL
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Common bamboo for construction

Approximately 1500 species of bamboo exist in the world, out of which 20-30 giant timber bamboo are most suitable for bamboo construction. The best bamboo for construction is the one available locally because shipping giant bamboo poles across the globe can increase the cost and have a bigger environmental footprint.

Local bamboos may not have the size of Dendrocalamus Asper or Guadua Angustifolia. However, smaller bamboo poles can be used to achieve larger spans by using an appropriate design. The geometric principles explained in this book allow us to create surface active grids that can use bamboo with smaller diameters and build large structures. Another approach is to bundle smaller bamboo poles to achieve larger spans.

There are two main types of bamboo depending on their growth habits: clumping (sympodial) bamboo and running (monopodial) bamboo. Clumping bamboos are most commonly found in tropical areas and running bamboos in sub-tropical and temperate areas. Although their natural habitat overlaps depending on local microclimate, some clumping bamboo can be found in temperate areas and vice versa.

Here is a list of the most common bamboo suitable for construction along with their short description. The list identifies the most common bamboo and is not a comprehensive list by any means. There will be other locally available bamboo that might be suitable. It is best to check what is available locally and its properties in terms of length, diameter, and wall thickness to determine if it is suitable for construction.

Large elegant clump of Black Dendrocalamus Asper 'Hitam'

Dendrocalamus Asper

Dendrocalamus Strictus

Important Bamboo Species for Construction

- *Guadua angustifolia - Central and South America*
- *Dendrocalamus asper – Tropics*
- *Dendrocalamus strictus – Tropics*
- *“Thorny Bamboos”, i.e. Bambusa spinosa/blumeana/bambos etc*
- *Thrysostachys oliveri/siamensis – Southeast Asia - Tropics*
- *Bambusa balcoa – India - Tropics*
- *Bambusa oldhamii / vulgaris – Tropic*
- *Phyllostachys pubescens (syn. edulis) MOSO & P. bambusoides TEMPERATE REGIONS <Japan/China/Korea/Taiwan>*

Why plant bamboo in Europe?

To supply the local demand for a variety of products to reduce transport costs & emissions.

AND,

Local utilization provides jobs, economy, and renewable resources, with environmental benefits.

For over 200 years, the more commonly known bamboos have been distributed around the world in man-made environments, either for utility or for beauty.

***Phyllostachys edulis syn pubescens MOSO* in Zhejiang, China**

La Bambouseraie de Prafrance, near Nimes, France –
thanks to Eugene Mazel (1828-1890) and Yves Crouzet (1980s-1990s)

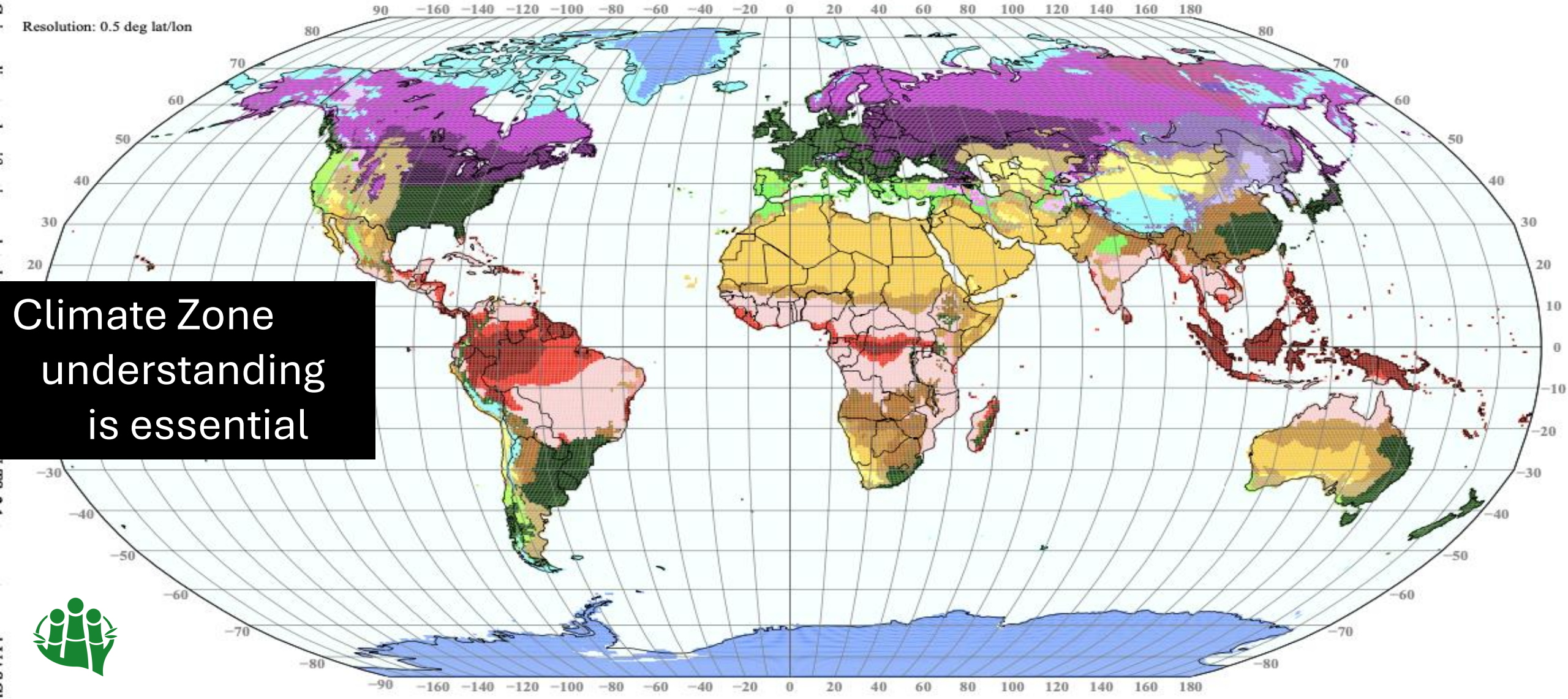
World Map of Köppen–Geiger Climate Classification

updated with CRU TS 2.1 temperature and VASClimO v1.1 precipitation data 1951 to 2000

Af	Am	As	Aw	BWk	BWh	BSk	BSh	Cfa	Cfb	Cfc	Csa	Csb	Csc	Cwa
Cwb	Cwc	Dfa	Dfb	Dfc	Dfd	Dsa	Dsb	Dsc	Dsd	Dwa	Dwb	Dwc	Dwd	EF	ET

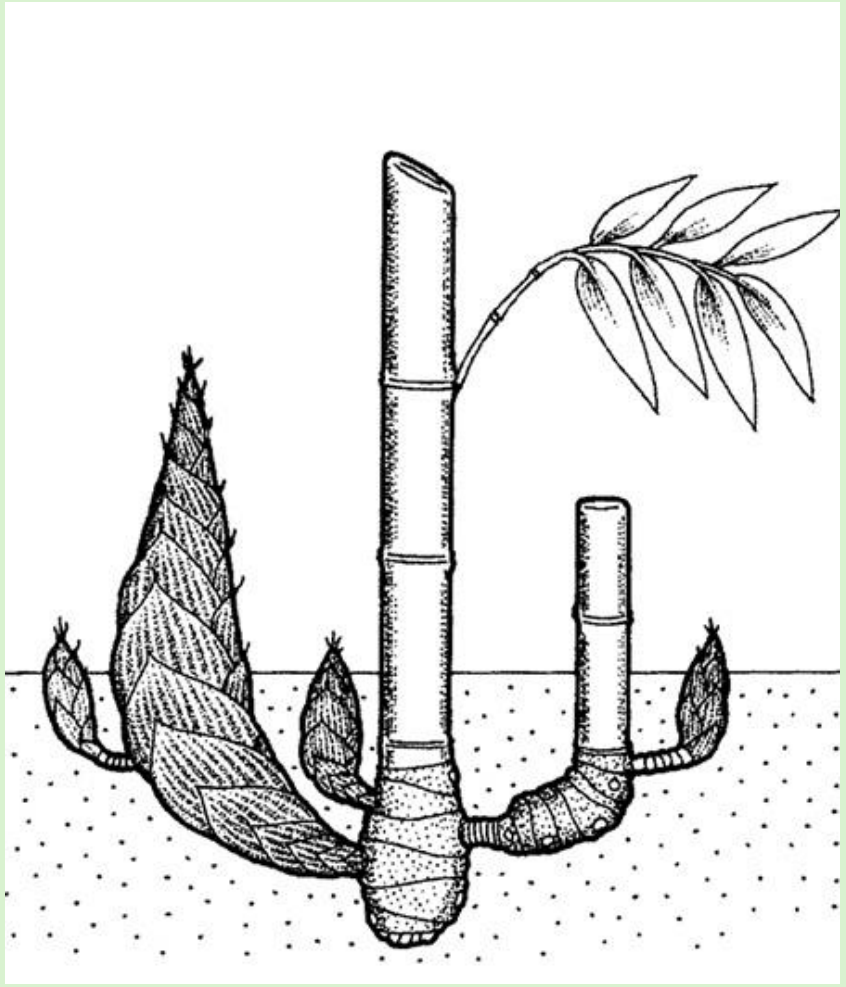
Main climates	Precipitation	Temperature	
A: equatorial	W: desert	h: hot arid	F: polar frost
B: arid	S: steppe	k: cold arid	T: polar tundra
C: warm temperate	f: fully humid	a: hot summer	
D: snow	s: summer dry	b: warm summer	
E: polar	w: winter dry	c: cool summer	
	m: monsoonal	d: extremely continental	

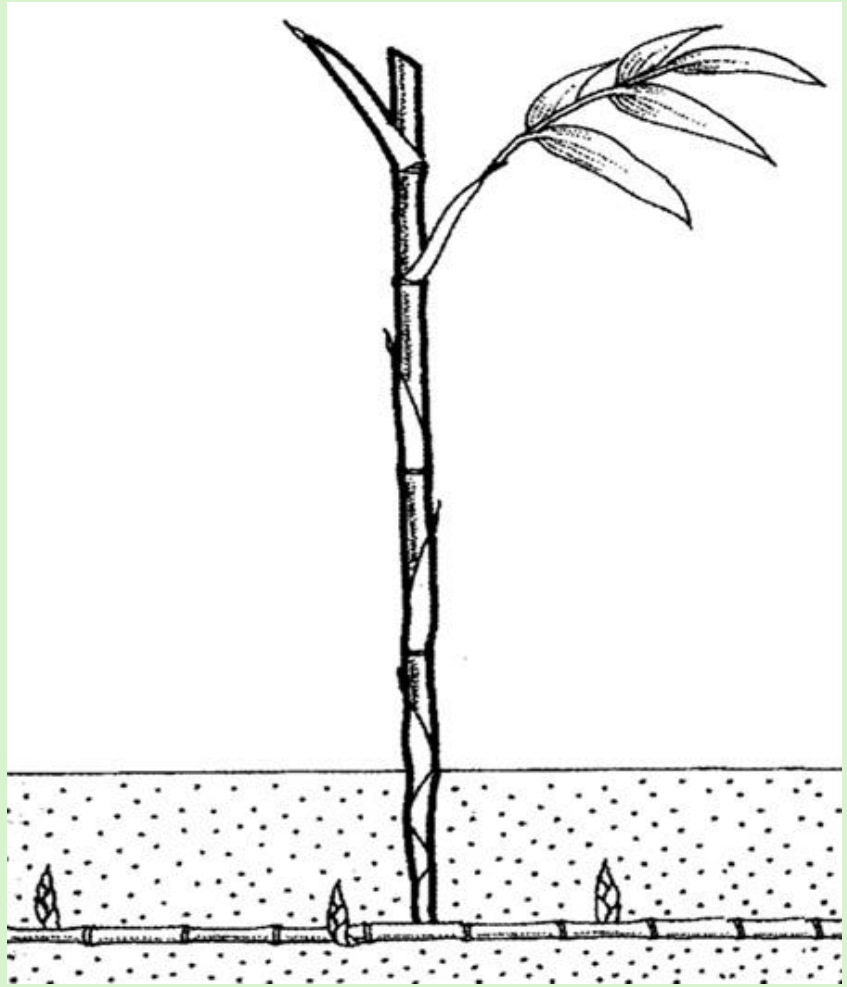
Resolution: 0.5 deg lat/lon



Climate Zone understanding is essential

Root systems vary, and are important in cultivation and management





Clumping (Pachymorph/Sympodial) vs. Running (Leptomorph/Monopodial)

For example: BAMBUSA **For example : PHYLLOSTACHYS**

Tropical bamboo plantation

Moso plantations in China (monopodial bamboo)

How to choose which bamboo to use

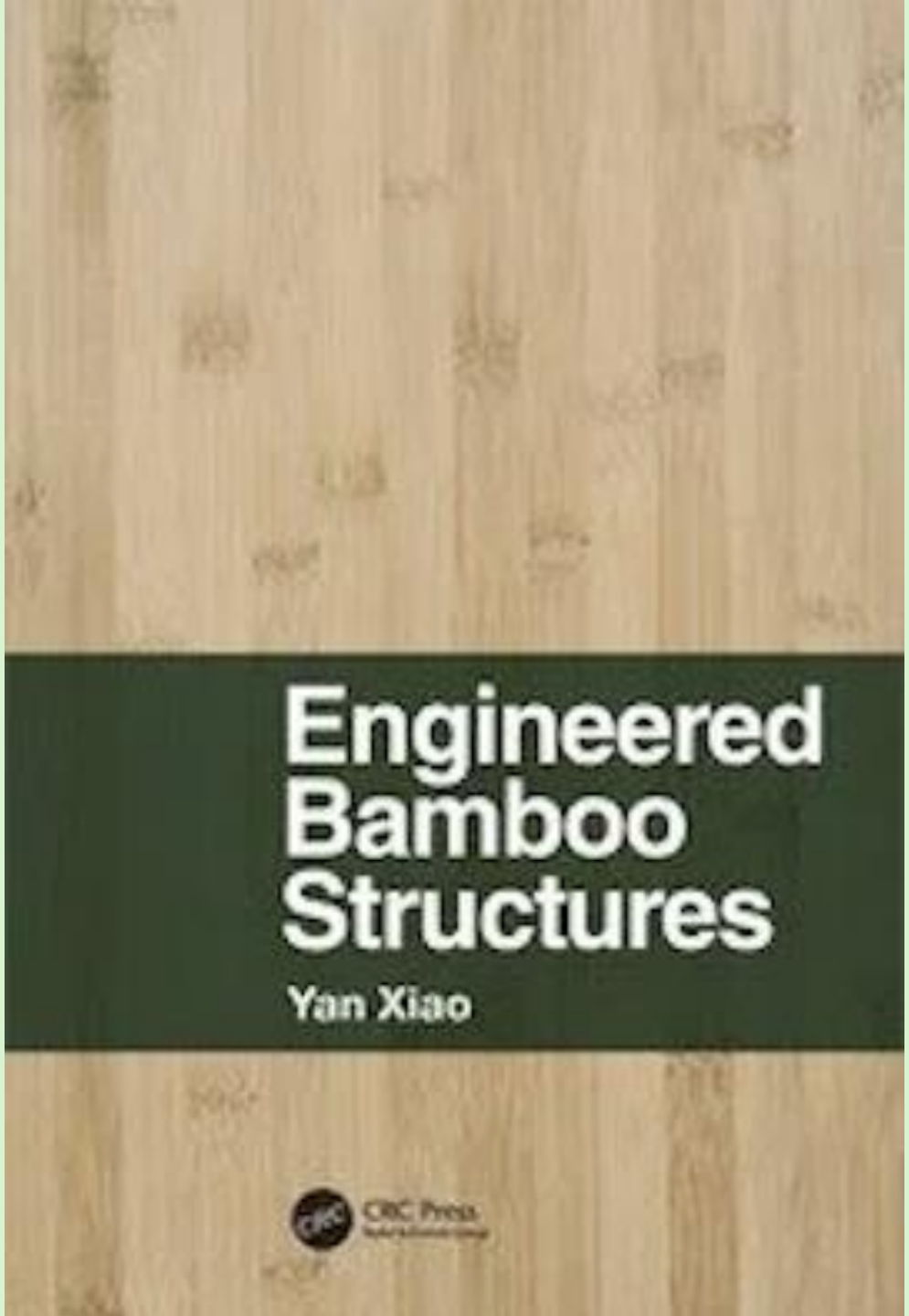
- Availability / Location
- Purpose (structural vs façade vs longevity, etc)
- Treated vs. untreated
- Mechanical properties (weight-bearing, bending, etc)
- Whole culm, splits, mats, engineered?

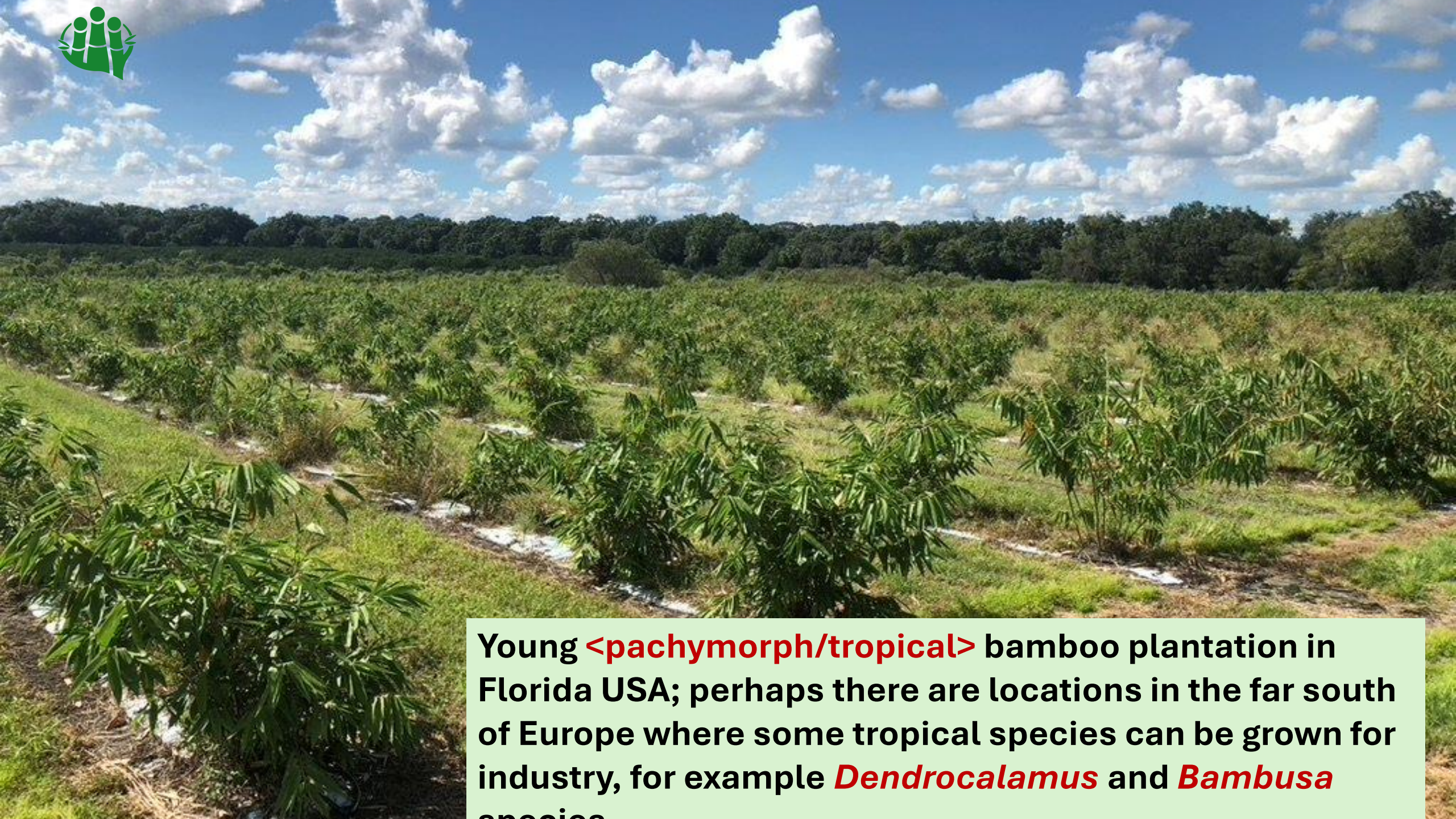
ENGINEERED BAMBOO / COMPOSITES: a new era

The majority of engineered bamboo products –

flooring, paneling, cabinetry, furniture, housewares, glu-bam –

are made from Chinese-grown Moso bamboo, *Phyllostachys pubescens syn edulis*





Young <pachymorph/tropical> bamboo plantation in Florida USA; perhaps there are locations in the far south of Europe where some tropical species can be grown for industry, for example *Dendrocalamus* and *Bambusa* species


New plantation in Southern Portugal,
Phyllostachys species (temperate/monopodial)
BambooLogic

New plantation in Southern Portugal, *Phyllostachys* species (monopodial/temperate)

BambooLogic

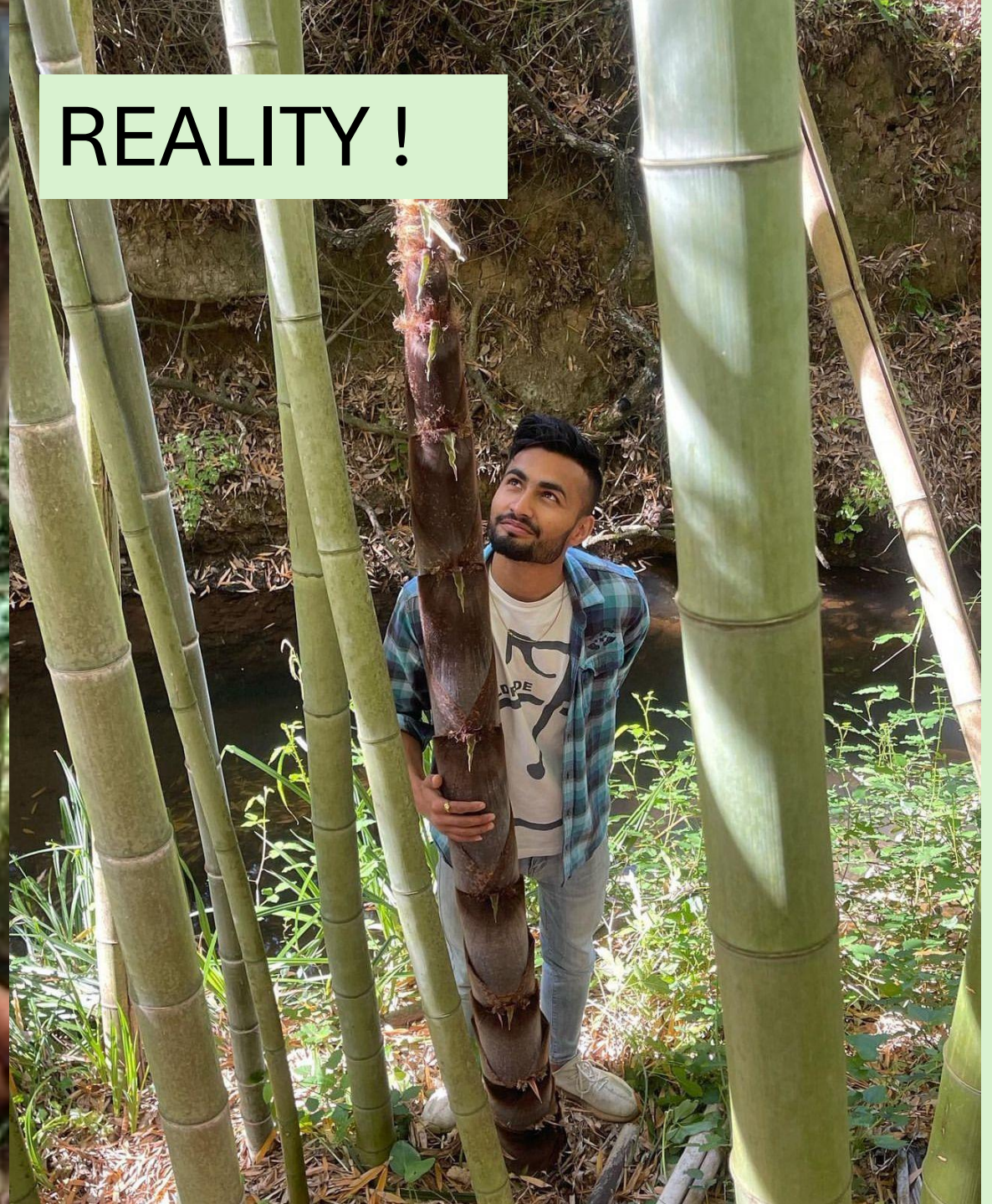

New plantation in Southern Portugal,
Phyllostachys species (monopodial/temperate)
bambu parque

The *Phyllostachys* species are growing!

Let’s see what tropical species can survive/thrive for a new industry in southern Europe!

DREAM ~

REALITY !



Growing bamboo is not difficult,
however growing bamboo as an industry is difficult.

Introducing a new agricultural crop poses many challenges:

- public and private sector acceptance,
- perception of "exotic" crops,
- selecting appropriate species for local climate,
- understanding cultural requirements of the species,
- sourcing the plant material
- maintaining the plantation
- respecting the local biodiversity and community needs,
- finding adequate labor to work the farm,
- MAJOR CAPITAL INVESTMENT

and VERY important: identifying your market and customers!

WORLD BAMBOO

Thank you.
Bedankt.

info@worldbamboo.net

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