

Prefabricated Bamboo Homes for Everyone

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BAM

*Bamboo Applications
and Manufacturing*



global challenges, require global solutions

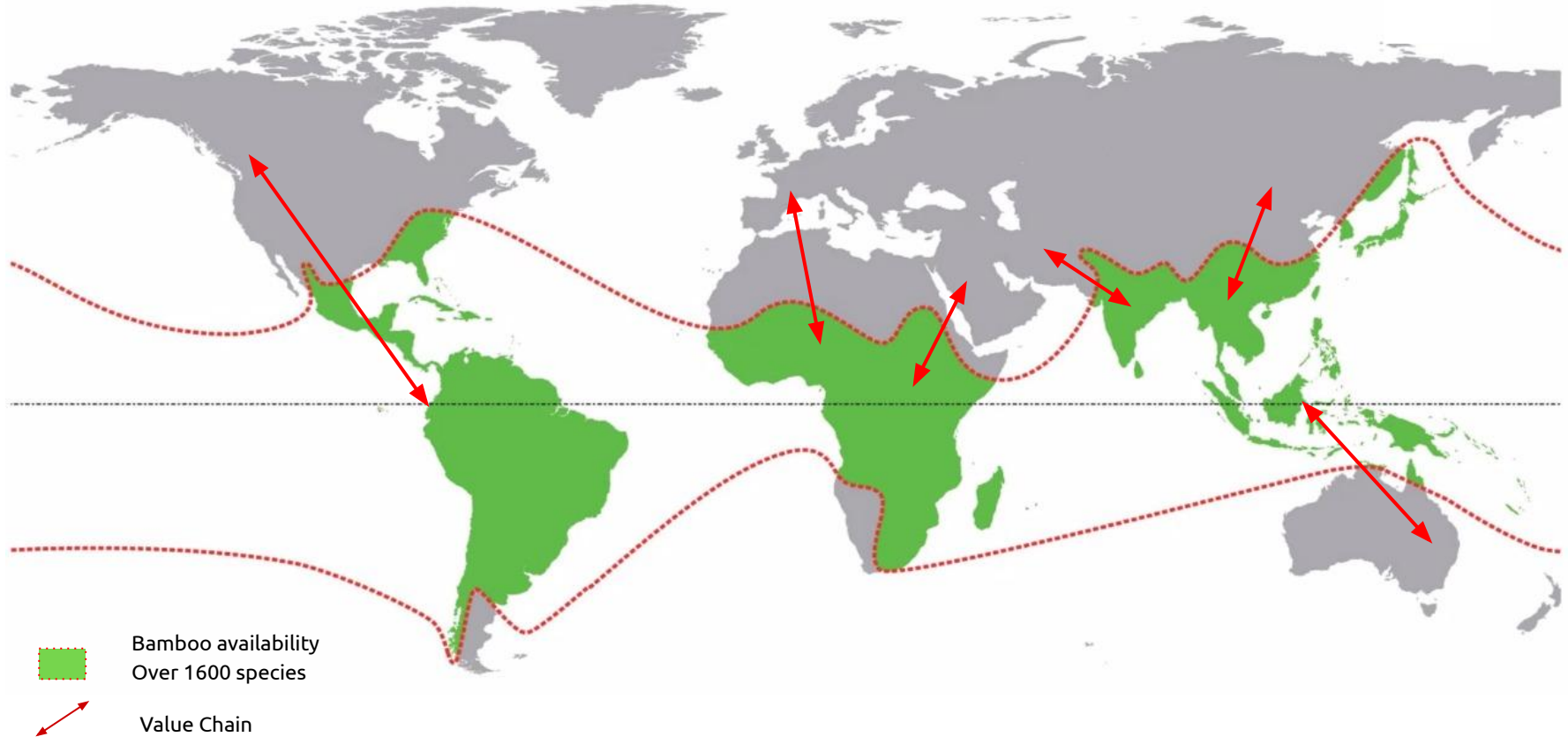


Earth is collapsing

Housing crisis

Lack of R&D

bamboo, a new global value chain?



bamboo, gold in the hands of the wise



Alleviates Deforestation

Grows 10x faster than wood

Its four year growth cycle outperforms timber's 40 to 60 yr cycle. .



Decarbonization

Up to 300 tonnes / ha

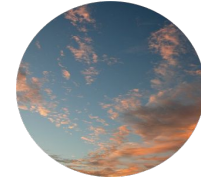
A hectare of sustainably managed bamboo forests captures between 90 and 300 tCO₂/ha.



Water Cycle

5000 liters per clump

Reforestation with bamboo helps absorb 2 million litres of water per hectare per year.



Renewable

No clear-cutting

Bamboo can be harvested continuously once established without replanting. Its extensive root system prevents soil erosion.



Strong

3x stronger than wood

Bamboo can be carbon-negative, structural building material.



Advanced Manufacturing

Suitable for prefab mass production

Bamboo is a fit material for robotic assisted manufacturing and on-demand product delivery.



Emerging Commodity

\$80 billion + industry

R&D in wood science and manufacturing have positioned bamboo as the material of the future.



UN Global Goals

Fosters 7 out of 17 goals

Foster a bamboo regenerative economy contributes to goals 1,7,11,12,13,15,& 17.



multi-disciplinary training for the #global goals



Mass timber engineering

Aspect Structural Engineers

@Vancouver, Canada

Bamboo bio-construction

Casa Congo Conservation

Arquitectura Mixta

@Latin America & Caribbean



Academic research

Bamboo Applications & Manufacturing Lab

@University of British Columbia, Canada

mass timber 101

Mass timber has enabled a building construction revolution, one that is made from:

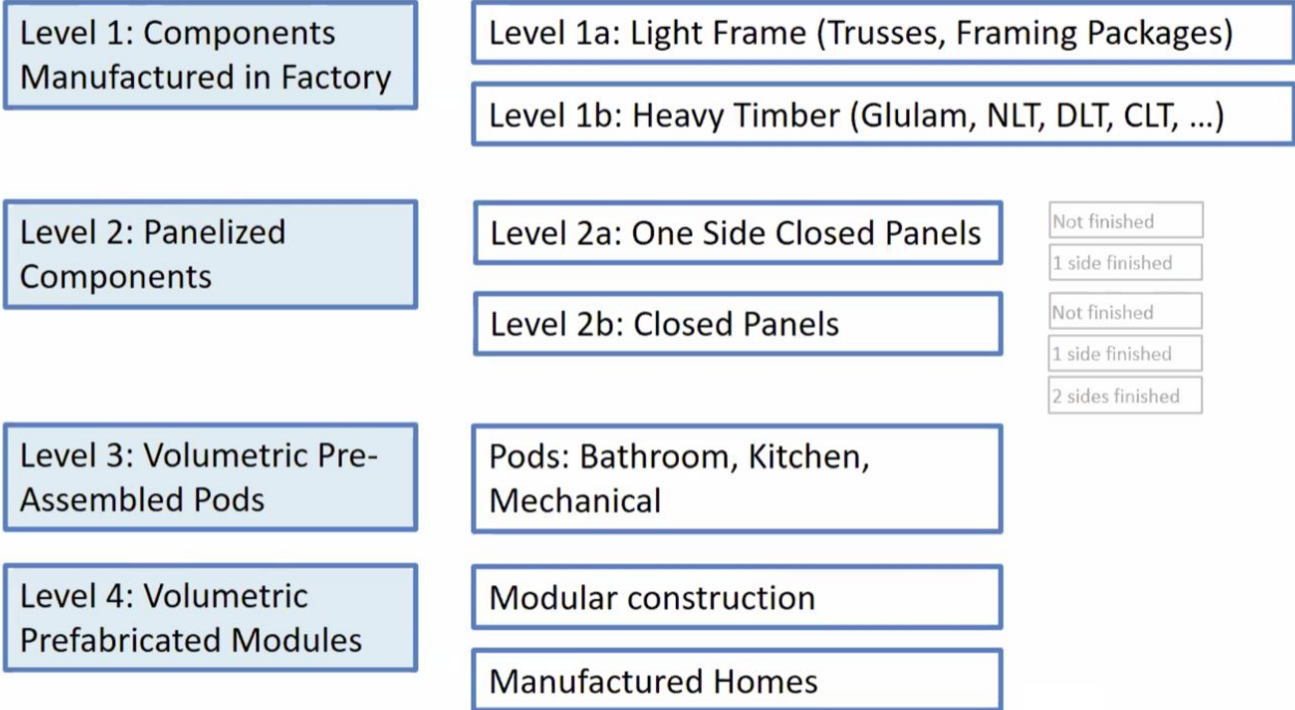
- Highly **renewable** building natural fibers
- **Carbon-negative** building materials
- Fast, efficient and cost effective **prefabricated** building solutions

The key products leading this revolution are:

1. Glued-laminated timber (glulam)
2. Cross-laminated timber (CLT)
3. Laminated veneer lumber (LVL)



prefabrication (prefab) 101



Sources: Goodier C., Gibb A.: Future opportunities for offsite in the UK. Construction Management and Economics, 25(6), 585–595., 2007.
Goodland H., Lam A., Taylor M., Zadeh P.: Cost Implications of Accelerated Construction Schedules. Vancouver: FP Innovations, 2019.
Wimmers G: Wood Technology Solutions Report, Quesnel: City of Quesnel, 2020.



Level 1 - Truss components



Level 2 - Panelized wall panel



Level 3 - Volumetric bathroom pods



Level 4 - Volumetric house modules

Kuna, a prefab panelized solution for everyone

Kuna is a housing and sustainable development platform that provides communities with assets to enable **income generation, education** and **environmental conservation**. Our vision is to solve the global housing crisis, one bamboo pole at a time.

The Kuna bamboo home overview:

- 50 square meter single family home: 2x beds, 1 bath, 1x living, 1x roofed patio
- Decentralized wastewater treatment & rain-water collection systems
- 3 day prefab + assemble from top of concrete to roof
- Stores 6.7 tCO₂e
- Affordable @USD 250/sqm



Participatory community insights

El Astillero, Nicaragua 09/2020 - 01/2021

Survey Data Points (October 2020, 190 Families)

Average monthly income

Average monthly grocery expense

Average monthly electricity and water bills

Average monthly mortgage payment capacity

Household that runs a business from the house (pulperia, etc)

Household awareness of bamboo as a construction material

Household willingness to live in a bamboo house

Amount of families with property ownership title

Amount of time families are willing to commit to build their own house

Amount of families willing to help their neighbour build their house

Results

3,400 cordobas (\$115)

2,000 cordobas (\$65)

160 cordobas (\$3.30)

400 cordobas (\$14)

52%

75%

70%

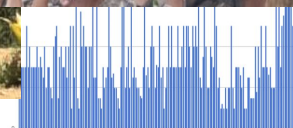
48%

40 hours / week

100%



... to Bamboo as a Building Material



Salario promedio por familia: 3,400 cordobas / month

the Kuna prefab process

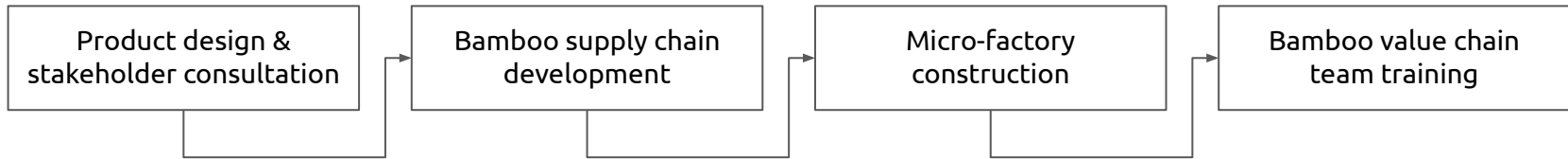
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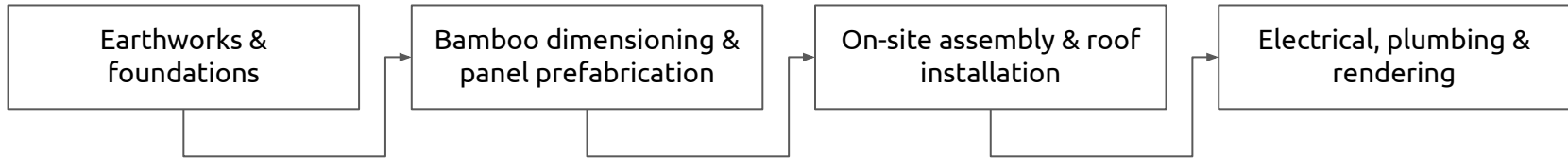
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4

Pre-project phase: 4-8 months



Project phase: 60 working days x 20 homes



Earthworks & foundations

Bamboo dimensioning & panel prefabrication

On-site assembly & roof installation

Electrical, plumbing & rendering



Earthworks &
Foundation

Bamboo dimensioning &
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a bamboo house over a concrete home?

Category	Key performance indicators
Embodied carbon	Equivalent tons of CO2 emitted per primary and secondary structural elements utilized per home
Structural safety	International building code compliance for gravity & lateral load systems
Fire safety	International fire safe code compliance to ensure safe fire rating
Affordability	Final cost per square meter
Speed of construction	Homes built per week
Resilient supply chains	Tons of raw material available per continent Years required to regenerate structural raw material consumed per home Distance of raw material to project location
Equity, diversity & inclusion	Male to female ratio Workers wage as percentage of total cost Certified bamboo carpenters per training course

Let's build with bamboo.

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