BAHAY KAWAYAN

/ Post Disaster Housing in Bamboo

Elizabeth Wagemann,
Ana Gatóo, Michael Ramage

Cambridge, Inglaterra, 2014

In November 2013, one of the biggest tropical storms in history hit the Philippines, the second most vulnerable country in its exposure to natural hazards according to the World Risk Report 2014. A team from the group Natural Materials and Structures from Cambridge University, that researches low cost constructive systems, designed an emergency housing unit for the region of Roxas, affected by the typhoon. The project received a prize at the international competition Versus: Lessons from Vernacular Heritage to Sustainable Architecture (Valencia, September 2014).

Based on local materials and techniques, a system of fast and easy assembly was designed, with the possibility of being disassembled or modified in time. The design reinterprets the Philippine rural house called *Bahay Kubo*, whose structure is built of bamboo, steep-sloped thatched roof to withstand tropical rain, over *pilotis* to face flooding and bamboo walls that allow interior ventilation. These traditional practices were incorporated in the design emphasizing three characteristics: a construction without the use of nails or screws, a structure capable of resisting winds and earthquakes, and a flexible design that allows modification. A vernacular building method was used based on the connection of bamboos by tying them with rope or fishing thread which, in opposition to nails, prevents the bamboo from cracking and splitting.

A prototype of the project was built with its complete structure and part of the wall system in the Department of Architecture at Cambridge University, to test the house's constructive feasibility and disassembly, the structural behavior of its connections and to analyze the spatial characteristics of the design. The model was built by a team of four people with no previous experience, and disassembled by only two people in three days. **ARQ**

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Arquitectos / Architects

Elizabeth Wagemann, Ana Gatóo, Michael Ramage

Equipo / Team

Daniel Jiménez, Mark Breeze, Bhavna Sharma,
Maximilian Bock, Allan McRobie

Ubicación / Location

Department of Architecture, University of Cambridge, uk.

Cliente / Client

ONG ADRA

Fechas / Dates

Julio / July 2014 – septiembre / September 2014

Cálculo estructural / Structural design

Daniel Jiménez

Construcción / Construction

Elizabeth Wagemann, Ana Gatóo, Daniel Jiménez

Materiales / Materials

Estructura en bambú Ø 3,5 y 10 cm, hilo de pescar (monofilamento de 1,8 mm), techo de paja, fundaciones de concreto, terminaciones de bambú Ø 3 cm, pantallas de bambú / Bamboo structure Ø 3,5 and 10 cm, fishing line (1.8 mm monofilament), thatched, concrete foundations, finishing bamboo Ø 3 cm, bamboo screens

Superficie / Built Area

23,04 m² (UK), 25 m² (Filipinas / Philippines)

Presupuesto / Cost

US\$ 230/ m² (UK), US\$ 34/ m² (Filipinas / Philippines)

Imágenes / Images

Ana Gatóo

Maquetas / Models

Ana Gatóo, Elizabeth Wagemann

/ BIBLIOGRAPHY

GATÓO, Ana; WAGEMANN, Elizabeth; H. RAMAGE, Michael. *Bahay Kawayan. A Transitional House for the Philippines*. University of Cambridge, UK, 2015.

ELIZABETH WAGEMANN

Architect, Master of Architecture, Universidad Católica de Chile; MPhil in Architecture, University of Cambridge, UK. She has taught at the School of Architecture at the Universidad Católica de Chile. She is part of the Natural Materials and Structures research group at the University of Cambridge, UK.

ANA GATÓO

Construction Engineer, Universidad de Alcalá de Henares, Spain; msc in Architecture, Gadjah Mada University, Indonesia. Her work includes building sustainable and economic housing in Indonesia and Latin America, and the analysis of bamboo structures. She is researcher at the Natural Materials and Structures research group at the University of Cambridge, UK.

MICHAEL H. RAMAGE

BA in Geology, Carleton College, USA. MArch, Massachusetts Institute of Technology, USA. He is specialist in the design, analysis and construction of timber vaults. He currently leads the Natural Materials and Structures research group at Cambridge University (UK) and teaches in the Department of Architecture at the same university.

Front elevation

E./ S. 1: 100

/ Lateral Elevation

E./ S. 1: 100

/ Floor plan

E./ S. 1: 100

Planta de techo /

E./ S. 1: 100