Housing in a Bottle
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Background
• Half of the families in Paraguay are below the poverty line.
• Up to three generations live under one roof.
• There is an increasing number of drought periods in Paraguay.

Objectives
• Construct the add-on as a model for low-income families and future projects.

Abstract
• Design low-cost add-on room for the beekeeping center in the San Francisco Agricultural School in Paraguay out of plastic bottles.
• Create an instruction manual in English and Spanish.

Final Design
• Bottles stacked horizontally in staggered pattern.
• Bottle necks tied together with string and secured with adobe.
• Rainwater collection system and bio-sand filter to clean water.

Results/Outcome
• A two liter bottle filled with sand can support 7,000 more pounds than a two liter bottle tightly packed with sand.
• At the maximum required load of 2,000 pounds, the deflection of the two liter bottle tightly packed with sand is half the deflection of the two liter bottle filled with sand.
• Two liter bottles tightly packed with sand are the best building materials.

Method/Process
• Ran compression tests, testing both half liter and two liter bottles filled with air (as a baseline), packed with sand, and filled with sand.
• Skype calls with client to clarify our goals in order to meet the necessity.

Conclusion
• Create walls using 2 liter plastic bottles tightly packed with sand.
• Add-on will alleviate overcrowding issues.
• Rainwater harvesting roof system supplies water in the dry season.
• Low-cost and sustainable design which can be implemented worldwide.

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The bio-sand filter
A compression test on a half liter bottle tightly packed with sand.

Bee-keeping center at the San Francisco Agricultural School in Asunción, Paraguay.

The final design of the add-on room

A 2 liter bottle tightly packed with sand after the compression test
A half liter bottle filled with sand after the compression test