Mitigation Park | Sustainable Post-Tsunami Reconstruction Masterplan, Constitución (Chile, 2010)

**Global Holcim Innovation Prize**

Sustainable Post-Tsunami Reconstruction Masterplan, Constitución (Chile, 2010)

Massive infrastructure to protect the city are useless (Japan, 2011)

MITIGATION PARK PLAN

January 2012. Delivery of the houses to the users is expected to happen in March 2013.

The first project consisting of 484 units with two housing typologies started construction in

In normal circumstances, the lives of people do not improve at the same rate as the economy. Reconstruction with an emphasis in public spaces set within a natural geography is an opportunity to improve the quality of life.

**LESSON AND ACTIONS**

1. City Built To Resist Natural Disasters
a. Alert System and Evacuation Plan.
b. For seismic activity of a large magnitude, it is necessary to dissipate the energy of large waves through forest rather than trying to retain them. The construction of parks and artificial landscapes mitigates the energy created while allowing occupation to move closer to the coast.
c. In areas adjacent to the mitigating park, form and materials of construction are carefully considered to withstand the force of water from tidal waves.

2. Adjust national code Nch 433 | Seismic Isolation For Basic Services
   Seismic isolation for strategic buildings for the same cost.
   Allow for basic services to continue to operate during and after catastrophes.
   Demand seismic isolation and allow for the calculation of structures isolated from the ground (rather than follow national code NCH 433).

Lighter structures are less expensive and pay for the cost of isolation.

3. Repair Urban Debt
In normal circumstances, the lives of people do not improve at the same rate as the economy. Reconstruction with an emphasis in public spaces set within a natural geography is an opportunity to improve the quality of life.

**DESIGN IN WOODEN STRUCTURES FOR INCREMENTAL HOUSING**

Designed with very low budget subsidies, the houses allow for an incremental growth, with an initial two bedroom on the second floor, a living dining room on the first floor and a bathroom.

The house is capable of growing to a final stage, almost duplicating its initial area of 48m².

The plan includes the local production of wooden manufactured materials, in this case provided by the company Arauco (based in Constitución city). In Chile visually graded lumber is often used for structural framing in housing. For the entire framing structure of these houses, we worked with C16 and C24 strength classes. This type of timber is machine graded, kiln dried and pressure-impregnated with a low-toxicity borate (SBK) preservative, offering several environmental benefits and providing excellent loading performance over time.

The result, is a more precise calculation of the strength of each piece of lumber than what is possible with visually graded lumber, allowing to use full design strength and avoiding overbuilding. This fact allows the structure to reduce the size of the elements for the structural framing, reducing the final volume of wood used for the project.

Finally, this structural innovation enables the project to compete in terms of costs with the final volume of wood used in a visually graded lumber structure and afford a better structural framing for the project.

The first project consisting of 484 units with two housing typologies started construction in January 2012. Delivery of the houses to the users is expected to happen in March 2013.

In this region, there was the ecology and the knowledge to grow a forest as an urban protection against tsunami. This project upgrades obsolete urban standards from 2.2m² of green space/person to 6.6m².

**FORESTRY INDUSTRY**

We take from the major development agent in the region, the know-how and innovation to design for two different scales.

**AGAINST GEOGRAPHICAL THREATS, GEOGRAPHICAL RESPONSES**

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<tr>
<th>Impact</th>
<th>1758</th>
<th>30 – 37%</th>
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<tbody>
<tr>
<td>Hidrodinamica</td>
<td>1172</td>
<td>30 – 37%</td>
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<tr>
<td>Hidrostatica</td>
<td>745</td>
<td>40 – 48%</td>
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<tr>
<td>Elevation</td>
<td>5,03</td>
<td>23 – 28%</td>
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- Wave decreases to 2.8m (1.42 m/s) after crashing with the forest, the water reaches the city.
- Waves continues to advance 5 blocks in the city.
- Height average 3.5m - 4m

**HA11_LQOPT | SUSTAINABLE POST-TSUNAMI RECONSTRUCTION MASTERPLAN, CONSTITUCIÓN, CHILE**

<table>
<thead>
<tr>
<th>ECOLOGICAL</th>
<th>EFFICIENT</th>
<th>FASTER</th>
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<td>National code NCH 110B - Stress values for visually and mechanically graded timber.</td>
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<tr>
<td>Framing structure using C16 and C24 strength classes. These timber is machine graded, kiln dried and pressure-impregnated with low-toxicity borate.</td>
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