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# Ruined in minutes, rebuilt in harmony: how earthquake-hit city is rising from the rubble

Partnership formed after tsunami makes Constitución safer - and sweeter smelling

**Gideon Long** Constitución

Alejandro Hormazabal remembers exactly where he was in the early hours of 27 February 2010. "I was at home with friends, having a little party. We were on our fifth glass of rum of the night," he recalls with a smile. "Suddenly, the walls started to sway, and it was nothing to do with the alcohol. The whole house was moving back and forth. And it was moving in circles too, like it was being pulled by a centrifugal force. It was impossible to stay on your feet."

For three minutes, Hormazabal and his friends in the Chilean city of Constitución were in thrall to one of the biggest earthquakes ever recorded. With a magnitude of 8.8, it was 500 times more powerful than the one that had devastated Haiti weeks earlier; its force was felt across a huge swath of southern and central Chile, wrecking houses, bridges, railways, roads - and lives.

When the shaking stopped, Hormazabal ran across the road to his parents' house. They were shaken and scared, but alive. Wary of the threat of a tsunami, they all headed for higher ground.

Eighteen minutes later, the tsunami struck. Six-metre waves swept in from the Pacific, up the estuary of the River Maule, and smashed into La Poza, the riverfront district of Constitución. "It



**A man climbs over debris in Constitución, days after the earthquake and tsunami hit the city in 2010. Below: working on the new library; the portico of the new cultural centre**  
Photographs: Ivan Alvarado/Reuters; Gideon Long for the Guardian

**8.8**  
Magnitude of the earthquake that struck Constitución. Eighteen minutes later the tsunami came sweeping in from the Pacific

sounded like a train coming. Boom! Boom! You could hear each wave as it hit," Hormazabal recalls.

As dawn broke, he headed back to his house. "There were just six floor tiles stuck to the concrete floor, and that was it. Everything else had gone. I wandered the streets and found my neighbours, who'd also lost their houses. We went to the boat house, one of the few buildings still standing in La Poza. And we got straight to work that morning."

For three months, Hormazabal lived in the boat house, sleeping on a mattress and distributing food, water, clothes and shelters. The quake and tsunami killed more than 500 people in Chile - a quarter of them in Constitución. With no electricity or clean water, the injured had to be taken to Talca, the regional capital, or to the national capital, Santiago, nearly 200 miles away.

In Santiago, Andrés Iacobelli, Chile's new undersecretary of housing, realised recovery would be possible only with help from the private sector. So he spoke to Arauco, a forestry firm that employs thousands of workers in Constitución, and to his friend Alejandro Aravena, an architect at Elemental, which specialises in social housing. Within days, a plan for Constitución started to emerge.

In early March, Aravena flew to Constitución by helicopter. He found a city on its knees: "It was shocking. The destruction was on a continental scale."

"Constitución was without electricity for five days and without running water for 20 days," says Fabián Pérez, who worked for the town council. "There were five banks in town and for a month, all of them were closed. There was no supermarket, no business."

Arauco agreed to finance a sustainable reconstruction plan. Elemental would oversee its implementation - but it would do so by consulting local people. It brought in a consulting firm and Arup, a London-based engineering and design company. State input came from local and regional governments, plus the housing ministry. Projects were budgeted at \$150m, 70% of which would come from the state.

Elemental built an "open house" in the city's main square, where its ever-evolving plans were displayed. Anyone could take a look and make suggestions. There were regular meetings. "I went to every one," says Dolores Chamorro, 78, who has lived through many earth tremors. "It was fantastic, having these young architects come in to make us

think about the kind of city we wanted."

One pressing problem was what to do about La Poza, which was worst-hit by the tsunami. More than 100 families had lived there, and most had lost their homes. Some wanted to rebuild. Others wanted to move, but only if they could sell their land. Others had no plots to sell. It was a complex situation, says Juan Ignacio Cerda from Elemental. "Many of the fishermen were reluctant to give up their plots of land because they wanted to stay by the river, where they worked and where their families had lived for generations," he says. "There were also a few richer families who had prime real estate on the riverfront; they too were reluctant to move."

Elemental came up with three options. First, the land could be left fallow - the cheapest solution. Second, a protective wall could be built between the estuary and city. La Poza could then be re-inhabited. Third, La Poza could be turned into a forest, with the trees acting as a buffer against future tsunamis.

Constitución's citizens were invited to vote. They chose the forest which, according to Aravena, was wise. "If we had just left the land fallow and banned all future building, people would have inhabited it anyway - illegally and with-

out controls," he says. "The protective wall was the choice favoured by the big construction firms for obvious reasons - they would have got to build it, and also the houses behind. But the experience of the Japanese tsunami of 2011 showed us that protective walls don't always work. They can't withstand the force of nature. A forest, on the other hand, doesn't try to resist the power of a tsunami. It dissipates the impact instead."

And so La Poza, along with Orrego Island, a sliver of land in the estuary, was expropriated by the state at a cost of \$20m. Work has begun to sculpt an undulating forest floor to be planted with pine and eucalyptus trees; Cerda estimates the trees and hillocks will dissipate 40-70% of the power of any tsunami. Escape routes, lit by photo-voltaic lighting, will be built through the forest.

Another sensitive issue was what to do about Constitución's wood pulp mill. The city sits on the edge of Chile's vast forestry plantations. Near the centre, Arauco owns a mill that makes pulp for the packaging industry. It's an eyesore and belches out steam and noxious smells. But the plant and Arauco's nearby sawmills are the lifeblood of Constitución, employing 3,000 people directly and 10,000 indirectly.

The company was badly hit by the tsunami. One of its sawmills was flattened. The pulp mill was also badly damaged: drenched in seawater, it was out of action for three months.

After the tsunami, some residents argued this was the perfect opportunity to move the mill out of Constitución. The company eventually agreed it should be discussed. "We explained that if we moved the mill, we wouldn't just move it a couple of miles," says Charles Kimber, its director of corporate affairs. "We would move it a long way south, and Constitución would lose jobs. That effectively ended the conversation."

Still, Aravena insists, it was important to have demonstrated that the company was willing to listen to the community.

Arauco made concessions, including spending \$10m to reduce odours. These days, even residents admit the wood pulp smells (which resemble rotting cabbage) are not as bad as they were. Arauco also resolved to tackle transport noise, and to use excess steam to heat a series of open-air swimming pools to be built on the seafloor. Currently the steam is pumped out over the city. "Our community relations have improved since the earthquake," Kimber says. "We



'Six tiles were stuck to the floor. Everything else was gone'  
**Alejandro Hormazabal**



'The young architects made us think about the city we wanted'  
**Dolores Chamorro**



'Families with prime land by the river were reluctant to move'  
**Juan Ignacio Cerda**

realised we couldn't get back on our feet without Constitución, and Constitución couldn't get back on its feet without us."

Public buildings needed to be rebuilt, or constructed from scratch - including the fire station and bus station, plus a theatre, school, library and cultural centre. Again, residents were consulted: "We asked them to prioritise," Aravena says. "Some said the bus station should be built first, for practical and economic reasons. Others had a more emotional response and picked the fire station, saying the firemen deserved it for the work they'd done after the earthquake. It's not for me, an architect coming from outside, to decide which is more important - a fire station or a bus station."

Housing was a pressing problem, and not only in La Poza. Hundreds of people elsewhere in the city had lost their homes. The government earmarked money for social housing but, as always, it was limited: \$10,000 for each house.

"What do you do when you have so little money to build with?" Aravena asks. "The traditional answer is that you build small, poor houses each measuring around 40sq m. But we decided that instead of building a bad house, we would build half of a good house."

The homes Elemental built measure 40 sq m, and include a kitchen/lounge, a bathroom and two bedrooms - but they can be expanded, at minimal expense, into a house exactly double that size. It's an idea based on public-private partnerships: the state pays for the essential half of the house, and the owner can then expand it at their own expense.

It would be wrong to suggest the rebuilding has been flawless. Aravena says he's had to cut his way through miles of red tape. Chamorro complains the process has lost momentum. But despite frustrations, Aravena, Kimber, Pérez and Hormazabal agree the reconstruction has been unique. No other place in Chile gave its residents such a pivotal role in the recovery. Nowhere has brought together so many stakeholders behind a single project.

Five years on, memories are still vivid. Pérez says he'll never forget the sound of the tsunami: "Imagine putting a rock inside a bucket and shaking it like hell. That's what it sounded like."

As for Hormazabal, he has reconciled himself to never again living in La Poza. "We've all had to give a little over the past five years," he says. "We've argued and we've fought, but we've also come together as a community."

