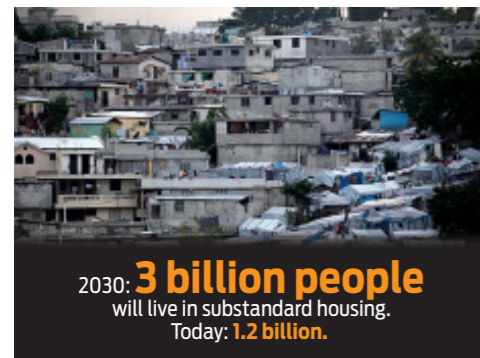


RESILIENT HOUSING FOR RESILIENT CITIES



2030: **3 billion people** will live in substandard housing. Today: **1.2 billion**.

WORLD POPULATION GROWTH

1970-2010: **+87%**.
In flood plains: **+114%**.
In cyclone-prone coastlines: **+192%**.



81% of housing price increases explained by rising land prices.

FLOOD RISK AND HOUSING PRICES

1% increase in the yearly probability of flooding is associated with a **0.6%** decrease in housing prices.
If the chance that a home will be affected by flooding this year is **1 in 100**, over a period of 25 years, the chance is **1 in 5**.



60% of deaths from natural disasters are caused by earthquakes (4% of total natural disasters).

HUMAN CAPITAL LOSSES

The loss of income in a country for an occupied person dead in an earthquake:

> 50x GDP per capita.
Earthquakes cause **44,585 deaths** on average per year.



The home represents between **50% - 90%** of a family's assets.

SHARE OF HOUSING ON TOTAL PRIVATE DAMAGES AND LOSSES

ANTIGUA AND BARBUDA	2017 hurricane	36%
ST. VINCENT	2013 floods	93%
GUATEMALA	2010 tropical storm	44%
HAITI	2010 earthquake	37%



Reconstruction costs **>4x** what prevention costs. The bill is paid by the government.

ASSET LOSSES

US\$ 327 billion on average per year.

From earthquakes:	
HAITI	[2010] M 7.0° Cost: US\$ 8.8 billion .
ECUADOR	[2016] M 7.8° Cost: US\$ 3.3 billion .
From hurricanes:	
WORLD	[2017] Cost: US\$ 192 billion .

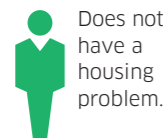


Natural Disasters can **erase achievements** in poverty reduction.

WELL-BEING VS ASSET LOSSES

Well-being losses: **60% higher** than asset losses.
People in the bottom 20%: Experience **11%** of total asset losses but **47%** of well-being losses.
Are **1.8 times** more likely than the average person to live in highly vulnerably buildings.

THE NEED TO REBALANCE HOUSING POLICIES



Does not have a housing problem.



Can purchase formal housing with a mortgage.



Can purchase formal housing with a mortgage and government subsidy.



Lives in informal and/or low-quality housing.

98% of housing subsidies support the acquisition of a house with a mortgage.



How could we avoid that scarce resources get to those who don't need it?



How could we leverage the investments families made on housing to increase resilience?

Each year, households invest **>30x** what the government invests in housing.

1. AFFORDABLE AND RELIABLE HOUSING ASSESSMENTS

WHERE CAN RESETTLEMENT OR RETROFITTING INVESTMENTS SAVE AND IMPROVE LIVES?

How could we harness imagery taken from the sky and from the ground to mimic the expert eyes of a Structural Engineer and operate at scale and low cost?

Mimic the Structural Engineer's expert eye



- DRONE**
- Distance to neighboring buildings.
 - Number of floors.
 - Slope of the ground.
 - Balcony detection.



- SATELLITE**
- Roof material.
 - Slope of the ground.
 - Size of the rooftop.



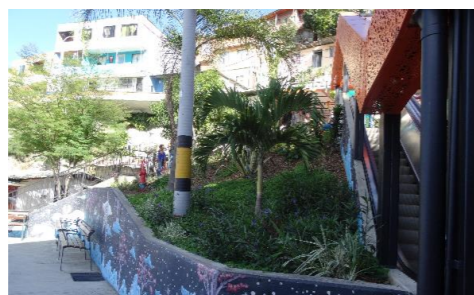
- STREET VIEW**
- Window/wall ratio.
 - Garages.
 - Land use.

2. THE NO-REGRETS STRATEGY

Prevent people to occupy hazards areas:



Ensure adequate use of public spaces and protect evacuation routes:



3. NEW HOUSING IN SAFER AREAS

ARGENTINA



- Self-construction strategy proved to be successful.

GUATEMALA



- By building trust and respecting legacy and cultural issues, it is possible to work with indigenous communities.

BRAZIL



- Large vertical solutions in same neighborhoods are viable but need to be well communicated.

SAINT LUCIA



- Successful housing solutions are those compatible with the circumstances of the beneficiaries.

4. SAFER HOMES IN EXISTING AREAS

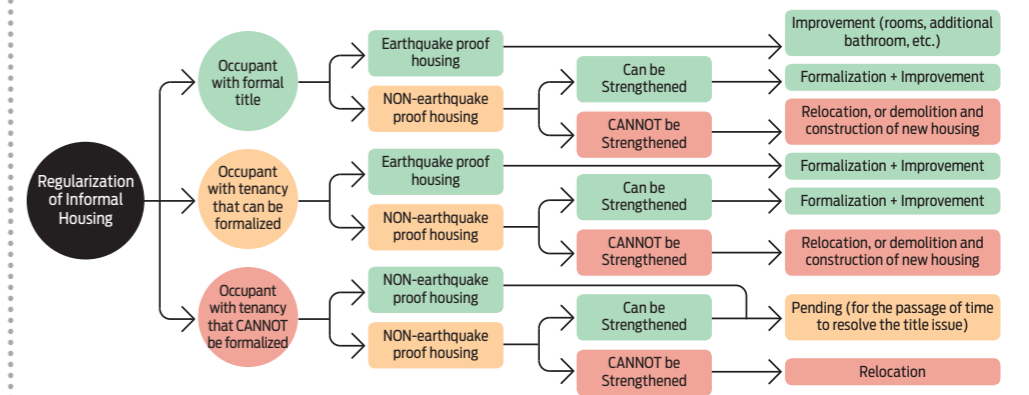
HOUSING RETROFITTING IS A SMART POLICY

Technically possible: For earthquakes and hurricanes, preferably small structures.

Affordable: 5%-20% of the value of a property. USA: earthquake retrofitting \$4,000-\$5,000.

Break even point: 10% in reduction of life-losses due to earthquakes.

REGULARIZATION, FINANCING FACILITIES AND/OR GUARANTEES CAN INCENTIVIZE RETROFITTING INVESTMENTS



- Saint Lucia Climate Adaptation Financing Facility (CAFF)** provides subsidized loans for households and businesses to increase building resilience of their properties.

5 BUILDING BLOCKS OF HOUSING POLICIES: Property Rights | Land with basic services | Finance for developers and end-users | Construction materials and technology | Effective Demand.

HOUSING = A MATTER OF LIFE AND DEATH | FAMILIES' MOST IMPORTANT, AND SOMETIMES ONLY, ASSET | A SOURCE OF ECONOMIC GROWTH OR INSTABILITY.