

A Story of Floods...

in Piura, Peru



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2023, Lucia Gherzi Figallo

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A special thanks to the people that shared their stories with me

To my trip companions

The interviews conducted during the field trip and presented in this text have been faithfully translated from Spanish to English.

For uniformity of the text, the bibliographic sources in Spanish or French have also been translated into English.

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Standpoint

The exercise of writing an “Énoncé théorique” allows architecture students in their second year of Master to jump abruptly into a subject of their interest. The topic, that doesn’t need to be anchored in any previous specific learning or work experience, is chosen freely and becomes implicitly a presentation card. Each student’s personal journey, and specially our intentions, mark an internal difference of focus, concerns and principles among the same profession, determining our social and professional posture in a future role as architects.

Therefore, in the case of this report, the intentionality is set on studying the responses of post-disaster architecture and the role of the architects due to a personal involvement and a social concern.

Architecture, responsible for being the built framework in which society functions, has a direct impact in people’s development and their way of subsist before, with and after a catastrophe. Thus, the understanding of people’s living conditions, especially the most vulnerable communities, should have a priority in architectural responses, particularly while traversing periods of crisis that can lead to a greater difference in their recovery and general progress.

In particular, I suggest that post-disaster architecture is detached from the victims and their necessities, showing a lack of commitment in its social, political and scientific mission to solve problems derived from catastrophes in the best possible way with the least amount of resources, in favor of the most vulnerable people.

In a world of multiple crisis, I, as a Peruvian student at the EPFL, look to contextualize the study of disaster-responses in a series of villages in the periphery of the city of Piura, in Peru, due to the high vulnerability of that population¹ in relation to the floods from El Niño phenomenon.

1 The high vulnerability profile of the people inhabiting the area in facing a catastrophe corresponds to a peripheric status but also to their everyday life and its susceptibility to climate changes that affect their livelihoods; limited range of economic activities; connectivity and accessibility difficulties; lack of strong network ties to authorities; among others. This in a national context of under-development.

Peru, a developing country in a globalized world where priorities are put in profit rather than people's benefit, reflects how "*...each society produces a specific space corresponding quite closely to the state of its social relationships.*" [1, p. 22] The rupture between urban areas in relation to the periphery and rural areas is strongly present as well as increasing inequalities and segregation that are aggravated under critical situations. Therefore, the peripheric status of the chosen settlements in Piura concerns not only their geographic location but their exclusion of power in terms of politics, economics and concentration of knowledge, technologies, sciences and art. These villages, along with others similar "*illustrate environmental and social dysfunction and deterioration, clusters of problems designated as "syndromes of global change."*" [1, p. 27] This power control, materialized in the territory translates in a lack of resources for the affected population to face a disaster and the derived consequences.

Bearing in mind that the catastrophe as its conceived today can no longer be considered just as a misadventure separated from its social, political, technological and economical aspects and repercussions, I begin this work by exploring a de-construction of the image of catastrophe to understand the role that architects and post-disaster architecture can play in it. Pursuing a social interest, I put forward the testimonies of local people interviewed on site to share their different perspectives. These exchanges allow to study later the different angles, priorities and objectives of post-disaster architecture phases.

With a focus of change in social practices related to disaster responses, it's important to consider that innovative social practices tend to come from the need to respond to crisis. With this in mind, post-disaster architecture and architects can play an important role in developing responses that think and work with the people, making them an instrument to develop legitimate proposals. [1]²

2 [1] Y. Pedrazzini, J. Bolay y V. Kaufmann, "Social Practices and spatial changes"



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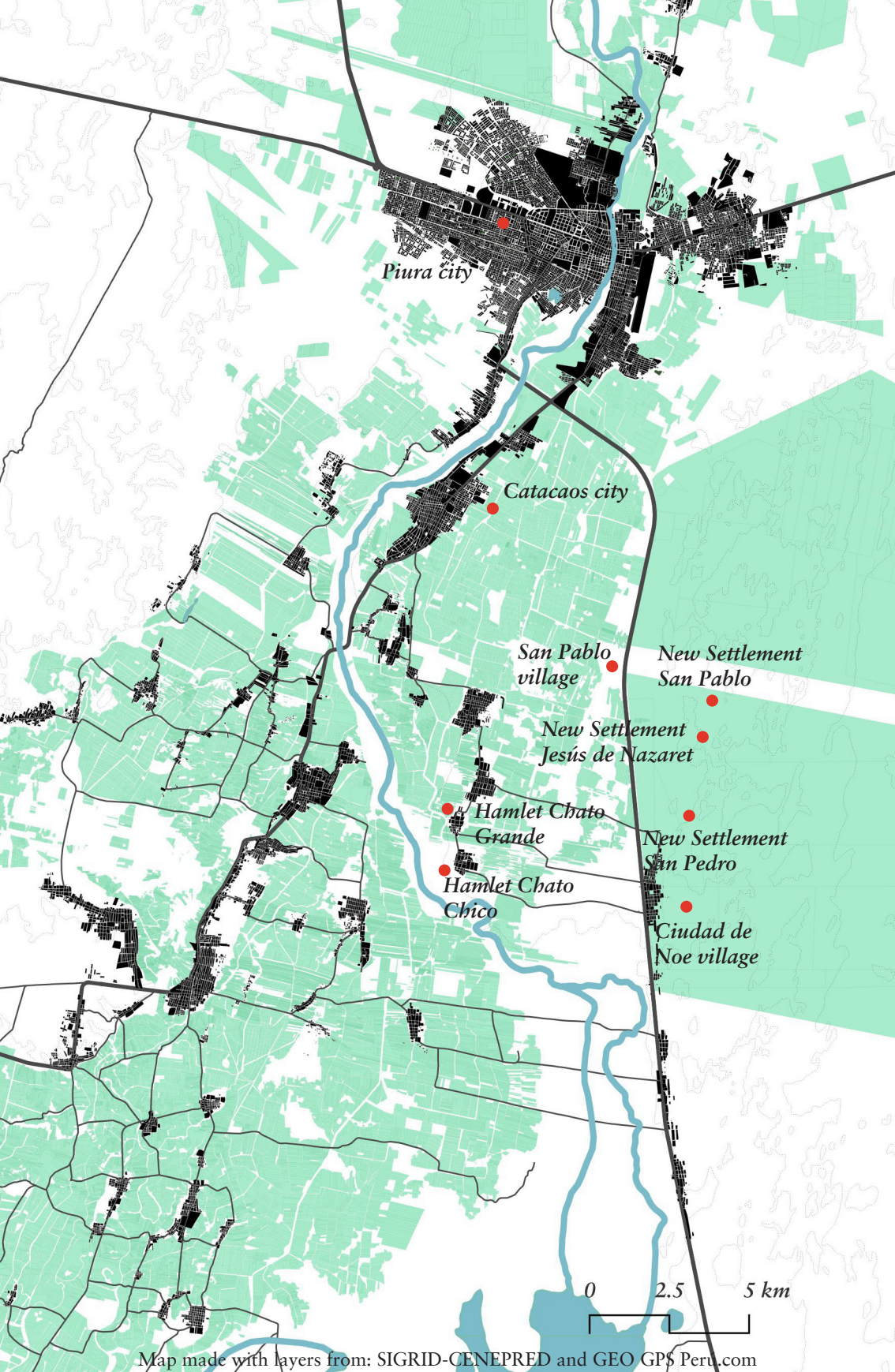
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Introduction:

A story has many ways to be told. This is only one. The following text seeks to study the impact of floods caused by El Niño phenomenon in Piura, a region in the North Coast of Peru, characteristic in terms of disaster's scenario related to floods in a desert ecosystem. Hosts of the catastrophe, this story takes the representative situation of a series of villages, human settlements and hamlets in "The Low Piura", often referred to as the new settlements of Kilometer 980 of the new highway, to address the post-disaster architecture and the role of architects in the aftermath of the latent floods from 2017.

Peru, a developing country in South America, presents a multi-crisis context in itself, due to constant political instability,³ corruption, deficient institutional capacity, centralization, uncontrolled urban sprawl and poverty; in addition to natural disasters such as floods, earthquakes, landslides, natural fires, etc. The catastrophe, which finds its origin in a natural event, in this case El Niño Phenomenon, is built and conditioned to external factors that make it be perceived and lived differently. For this work, the focus will be put in the people living in the periphery of the cities due to their higher vulnerability and the ongoing problematic they are facing.

3 Former president Pedro Castillo is currently in detention after being vacated on December 7, 2022. The country is divided in opinions for and against the decision to remove the president. Numerous strikes and rebellions have followed because the correct judicial protocols were not followed.



CHAPTER

I Deconstructing the Catastrophe

Is there a shared responsibility between the people and the government for the catastrophe's result? Are disasters really natural?

Definitions:

A catastrophe, to be defined as one, needs to affect or endanger in some way our society and our way of living. This social factor makes it always be related with an emergency status. Although there is no universal definition for the concept of emergency, it can be described as a *“state in which normal procedures are suspended and extra-ordinary measures are taken in order to avert a disaster.”* [2, p. 10]⁴

A disaster, on the other hand, can be used *“to refer to collective events that -at least temporarily, and often for years afterward-suspend normal daily routines owing to widespread damage.”* [3, p. 2]⁵ This definition includes natural disasters causing a communitywide damage, provoking a level of suffering that exceeds the people's capacity of adjustment and translates in social and material losses. [2]

The catastrophe, conceived as a disaster with a greater scope of negative impact, and therefore a higher collective stress, goes according to a more critical response capacity. In other words, during a catastrophic event, the affected individuals can't count on institutional help and therefore have to face the early consequences on their own. [4]⁶

4 [2] WHO/EHA, “Disasters and Emergencies, Definitions”

5 [3] D.P. Aldrich, “Building Resilience, Social Capital in Post-Disaster Recovery”

6 [4] C. V. Calderón, «Concepto de Urgencia, Emergencia, Catástrofe Y Desastre: Revisión Histórica y Bibliográfica»

The difference in the terminology and their level of impact should help to clarify the different emergency status and identify the most vulnerable areas and populations to give a consistent response. To address the various catastrophe factors, it is needed to recognize the root of these vulnerabilities in the functioning of our own society and its development. These aspects, transferred to the different characters of the factors, natural and human-caused, have their own level of influence during the pre- and post-catastrophe scenarios.

Catastrophe Factors

Natural Factors:

El Niño

Among the natural factors in the catastrophe, we find ENSO, El Niño-Southern Oscillation, a cyclic climate pattern that involves an oscillation of the ocean-atmosphere system in the tropical Pacific due to changes in the mean oceanic temperatures, leading to a variation in the wind patterns, the superficial temperature of the sea and the levels of precipitations in a cycle from 2 to 7 years. [5]⁷

ENSO variations impact climate in a world-wide scale and presents itself in extreme forms as El Niño and La Niña. The changes in the heating of the tropical atmosphere alters the global atmospheric circulation, thus, it is credited for being the strongest source of interannual climate variability on the planet. [6]⁸

In the Peruvian context, the phenomenon was ironically named El Niño by fishermen with a religious connotation for its regular apparition during Christmas. [5] This event relates to warmer temperatures in the equatorial Pacific and is more addressed due to its catastrophic implications in floods and droughts in different zones of the country, for instance, the events of 1791, 1982-83,

7 [5] M.A. Cane, “The evolution of El Niño, past and future”

8 [6] US Department of Commerce, NOAA; “What is ENSO?”

1997 and 2017. [7]⁹ Also, the term “El Niño Costero” has been created to refer to a variation of El Niño with the same effects but only produced in Peru and Equator. This variant relates to the cold Humboldt current along the Peruvian shores, which during “El Niño Costero” is displaced causing atmospheric condensation by vaporization and triggering conflicts by flooding and landslides as well as in fisheries, an important resource for local fishermen. [8]¹⁰

Due to its catastrophic effects related to floods and intense rains, “El Niño Costero” from 2017 could be considered as the third most intense of at least the last 100 years for Peru, according to the National Study of El Niño phenomena. [9]¹¹

Piura River and Rainfall cycle

As another natural factor we find the Piura River, vulnerable to extreme weather events related to El Niño, due to its location in the equatorial region. Furthermore, the regular rain cycle also suffers an increase of nearly three to four times the regular amount of rainfall during this climatic phenomenon, affecting directly the hydric capacity of the river, which is historically working with ever-decreasing volume. [10]¹²

Studies conducted in order to prevent further flooding in the Region have point out that the Piura River doesn't reach the Pacific Ocean and instead has formed a new temporary lagoon in the south called “La Niña”, filled by the constant flow of water from the Piura River and other secondary rivers during El Niño phenomena. [8]

This problematic finds its origin in the reduction of the speed and slope of the river due to an increased quantity of sediments that

9 [7] A.R Felices, “El impacto del Fenómeno de El Niño en zonas urbanas”

10 [8] R. Orellana, “Modelamiento hidrológico e hidráulico para el análisis de inundaciones en la ciudad de Piura utilizando HEC-HMS Y HEC-RAS”

11 [9] ENFEN, “Informe Técnico Extraordinario N°001-2017/ENFEN”

12 [10] Autoridad Autónoma de la Cuenca Hidrográfica Chira Piura, “Evaluación Local Integrada y Estrategia de Adaptación al Cambio Climático en la Cuenca del Río Piura”

have been installing at the bottom of the river over the years.¹³ The continuous reduction in the storage capacity of the riverbed will lead eventually to further and worst flooding in the future. [11]¹⁴

The section of the Piura River situated in “The Low Piura” corresponds to a semi-desertic climate and has been characterized as unsteady, presenting long dry periods that have led to a human manipulation through hydraulic systems in order to provide a constant water flow to allow the exploitation of the soil for agriculture and hydraulic energy. [10]

After briefly analysing these so called “natural” factors, it is important to recognize society's influence and responsibility in transforming nature to sustain our current way of life. For this reason, their “natural” character is strongly questionable given their ties with human behaviors and control strategies in relation with their catastrophic consequences.

Human-caused Factors

Public Mal-praxis and negligence

Catastrophe is the maximum failure of the system. Since we can't blame nature for our disasters we are forced to look into our societies. Since we are born, we are taught to see failure as a way to learn, forgetting our mistakes is only human to move passed them, however, forgetting or ignoring the causes and the consequences is neglecting the problem. When having a responsibility towards the well being of other people a constant overlooking of a repetitive crisis should be called cynicism.

El Niño phenomenon, as we saw, has been responsible for global climate variations from centuries ago. Knowing it's impacts in the national context and the most exposed areas, the government's management and planification methods in face of crisis situa-

13 According to Dr. engineer Jorge Reyes Salazar, from the Institute of Hydraulics, Hydrology and Sanitary Engineering in the University of Piura, the velocity has decreased from 5m/sec in 1983 to almost half of the speed in 2017, 2.6m/s. [10]

14 [11] E. Belletich, ““El río debe salir al mar antes de llegar a Sechura”

tions are highly questionable. Contrary to sudden occurrences and “monocausal” natural events such as earthquakes or storms, floods enter the category of progressive and multicausal occurrences [2]. Thus, the lack of preparedness adds another layer of gravity to the catastrophic impacts that here it’s called: negligence.

As Nancy develops in his book *After Fukushima*: “...we owe victims, beyond practical aid and basic care, is to show them that we know what they are victims of- even if it is harder to know that one is the victim of an entire system and not just a few “evil” individuals-even less of a “natural” catastrophe. Victims are victims in that they are treated as equivalent objects by a system that refuses to calculate certain risks because it calculates only by short-term productivity.” [12, p. 46]¹⁵

These “uncalculated” or neglected risks by the system are found as several plans and vulnerability studies with mitigation solutions that stay in paper rather than be executed to reduce negative impacts of floods in vulnerable populations.¹⁶ Programs and actions developed in these reports seek to create awareness but limit themselves to post-disasters scenarios due to the lack of a prevention culture. Furthermore, preventive measures related to new infrastructure or maintenance of the river further develop control techniques over nature while still neglecting their impact in the environment.

Centralization and uncontrolled urbanization

The centralized character of the country, which implies a concentration of political, legal and economic power in the capital, already infers a framework of deficiencies at a national level. The delay in investment in provinces translates in lower living conditions, lack of proper work conditions and shortage of basic facilities (for instance for health and education). These, among other factors, have pushed internal migration towards the coast axis of Peru, and

15 [12] J.L. Nancy, “After Fukushima: The Equivalence of Catastrophes”

16 An example of a mitigation and prevention study is “*Strengthening the disaster response in Peru, Lessons Learned from the El Niño Costero 2017*” [47]. Measures such as the ones presented in this report tend to lack of implementation due to local government’s reduced capacity.

particularly to Lima Metropolitan, since 1920. [13]¹⁷

Political mal-praxis, lack of control and demographic growth induced an occupation of the land by communities that employed the territory next to the river to access water for agriculture. This process, accompanied by an increasing gap between cities and rural contexts, have led to an un-controlled urbanisation (formal and informal) in the proximity of major urban centers by people looking for better opportunities even in danger zones, such as the riverbed of the Piura River in some areas of the Low Piura. [14]¹⁸

Among other problems associated with the government's centralization we find that the budget allocated to the regions for public investment related to health, education, transportation, among others, is usually not well distributed, returned, misused or stolen. Among the causes are the deficient control and organization within the institutions themselves. The unclear hierarchy in practice leads to theft of funds for investment due to corruption among authorities with no sanction. At the same time, the lack of implementation capacity of regional and local governments can result in unused funds, which return to the central government every year, or else in poor investment projects conceived in a hurry to reduce social tension.

Ignorance and Individuality

As a direct consequence of the centralized system and the country's underdevelopment, the lack of social, educational and cultural capacities can translate into behaviors such as informality, individualism and ignorance. These behaviors, that also interrelate between one and other, get materialized in a lack of conscience while occupying the territory. The limited capacity of the government to control urban sprawl, specially in provinces, plays a key factor in "allowing" hundreds of people to settle in vulnerable areas. However, in this study we also attribute a shared respons-

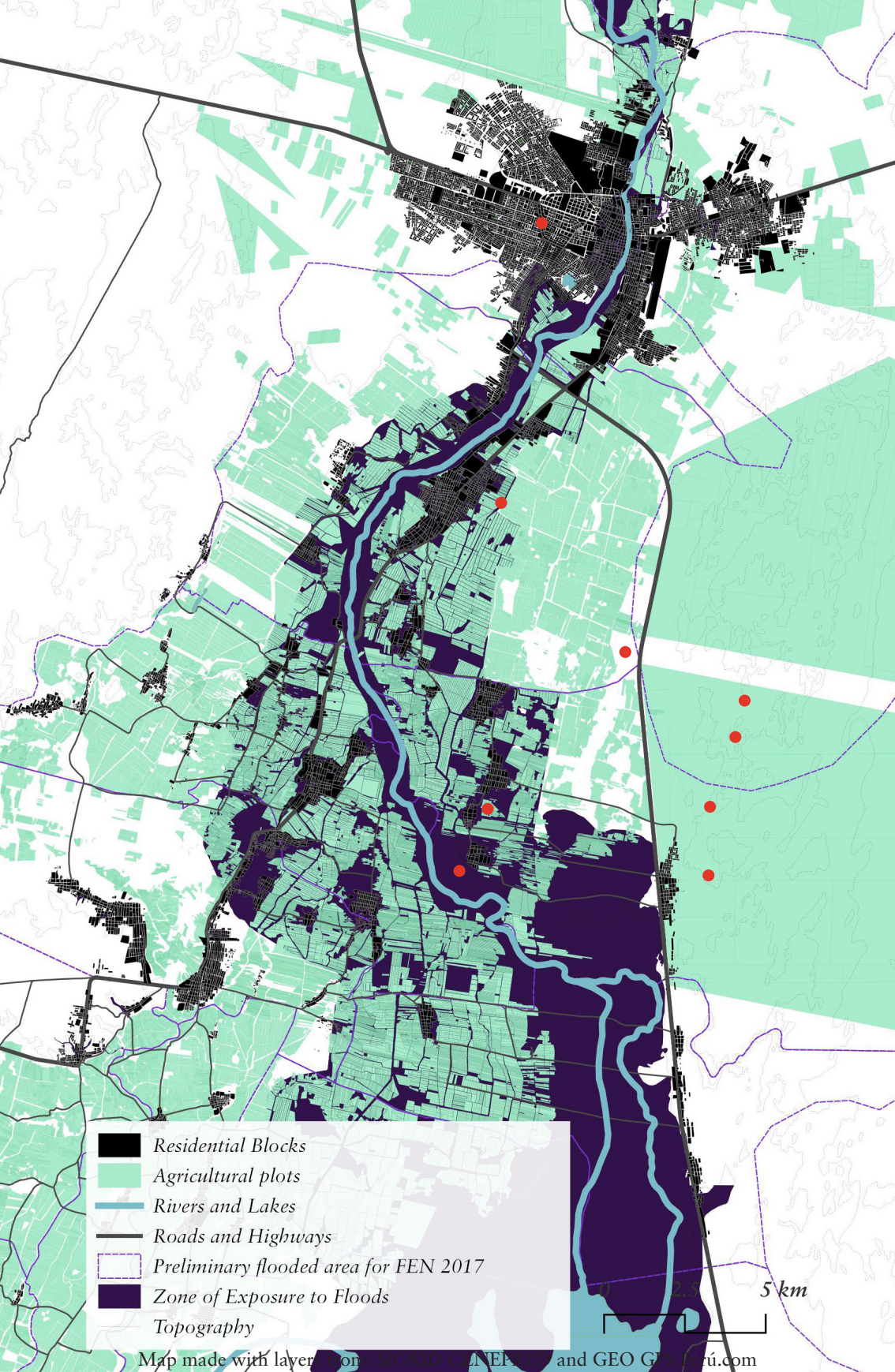
17 [13] E. H. Maguiña Salinas, "Esbozo de las migraciones internas en el siglo XX y primera década del siglo XXI y su relación con los modelos de desarrollo económico en el Perú"

18 [14] F. R. Miranda Valdivia, "La descentralización centralista en el Perú: entre la crisis y el crecimiento 1970-2014"

ibility to the people itself and therefore consider ignorance or lack of knowledge as a catastrophe factor during disaster events such as floods.

Human settlements, developed in an informal way in risk areas, can be a result of people's hope of acquiring access to farmland and eventually to a property title due to prescriptive acquisition, as it happens in other parts of the country. In the study area, one can observe a considerable amount of land plots in flood-prone areas, both formal and informal, despite the prohibitions of providing titles in recurrent risk areas.

Being fully aware of the zone's vulnerability and the informal character in which they establish themselves, people construct their houses without taking preventive measures during disasters. After the floods of 2017, many testimonies recognized how they underestimated the growth of the river and did not move until it was too late. Once the catastrophe arrives victims request to be relocated and be given permanent housing modules, together with basic sanitation work in untouched areas. Given the new site's characteristics and the capacity of the government, urban projects according to the demands of the victims suppose many years to implement and resources that the state doesn't have available. This situation raises questions about the limit line between the government's responsibility and the victim's personal responsibility in the face of the disaster and the demands that come later.



- Residential Blocks
- Agricultural plots
- Rivers and Lakes
- Roads and Highways
- Preliminary flooded area for FEN 2017
- Zone of Exposure to Floods
- Topography

5 km

Pro-disaster society- Global Issues

Over the years we have developed a society that uses control techniques over nature to the point of thinking technology is going to save us from all evil. In a framework of general worldwide crisis, society is just starting to face an energetic crisis, a technological crisis, global warming, which brings climate change, among others. In this story, climate change becomes the main global issue due to its direct influence in the catastrophic factor of natural disasters. Nowadays, when deconstructing the catastrophe, it's becoming harder, even impossible, to distinguish the limits of human's influence in the causes and repercussions. As Nancy explains: "*There are no more natural catastrophes: there is only a civilization catastrophe that expands every time. This can be demonstrated with each so-called natural catastrophe - earthquake, flood, or volcanic eruption - to say nothing of the upheavals produced in nature by our technologies.*" [12, p. 34]

This quote is illustrated, for example, when we analyse the development of El Niño Phenomenon. Conducted studies show that the onset regime of ENSO has displaced from eastern to western Pacific, resulting in a higher frequency of extreme events since the 1970s that could worsen in the future. This would be attributed to the significant warming trend in the equatorial western Pacific, coincident with global warming for which we are all responsible. [15]¹⁹

The worsening of the El Niño phenomenon would lead to increased rainfall, droughts, decline in fishery, famine and plagues in different regions. In turn, this would be reflected in loss of human lives, material losses, growing social and political unrest, economic changes through a globally networked system. What for centuries was only perceived as something natural and even expected, such as the wet and dry seasons where periods of heavy rains were part of the agricultural cycle, now could mean a shake for society's foundations. [12]

19 [15] B. Wang, X. Luo, Y.-M. Yang, W. Sun, M. A. Cane, W. Cai, S.-W. Yeh y J. Liu, "Historical change of El Niño properties sheds light on future changes of extreme El Niño"

Flood implications

Flood implications have a physical and a psychological impact for the affected population. Around the world, estimations say that 19% percent of the world population in 2020 are exposed to a significant level of flood risk with an increasing tendency. Although each country and each person deals with its own vulnerabilities, floods suppose one of the most common natural events that can lead to a high amount of suffering for one in every 5 persons. [16]²⁰

Often enough we forget that meteorological impacts last around a year to year and a half, but indirect impacts can prolong themselves after many years. Another layer of complexity with natural hazards such as floods or earthquakes is their impact in several sectors at the same time rather than a punctual effect [17]²¹. This generalized impact translates after in a longer and more difficult process of recovery due to the involvement of multiple institutions and actors.²² Also, it's important to keep in mind, that even though economical impacts at the country level suppose a partial destruction of the economy's capital stock, it should not eclipse the severity of the total economical collapse that the most vulnerable people may face at the local level.

After catastrophic events a feeling of empathy and solidarity is shared at a global scale. Helping networks among local people, national and international institutions are established to work together in favor of the affected persons. However, as it tends to happen in an accelerated world with multiple crisis all around, once the novelty has passed, we forget that the fundamentals of the problems remain unaddressed and the crisis continues to live on with thousands of people.

Secondary and tertiary impacts associated to food security, agricultural production can continue for months and years among the

20 [16] M. Salhab; J. Rentschler, "Flood Exposure and Poverty in 189 Countries"

21 [17] Nexus, "El fenómeno de El Niño y sus impactos asociados"

22 Floods related to El Niño phenomenon from 2017 left only in Peru 1.9 million affected people, several mortal victims and material losses valued in millions. [48]

victims. Derived problems affect the livelihoods, health, water, sanitation and education sectors. Specially in underdeveloped countries where infrastructure systems such as drainage and flood protection are less developed, floods often cause unmitigated damage and suffering that governments are unable to respond integrally and efficiently. [17]

Among the critical impacts that take a long period to get restored are the collapse of water and sewage systems. This at the same time triggers an increased consumption of unsafe water, which can relate with to the collection of water with plastic insalubrious containers or by its collection from contaminated sources, deterioration of food preservation systems and their sale, implementation of common pots with risk of common outbreaks. [18]²³

Furthermore, related to health issues there is an increment of diseases related with diarrhea outbreaks and dengue, a disease caused by a virus carried by mosquitoes that appear due to the higher tropical temperatures and the humidity brought by stagnant water. This, accompanied with a collapsed sanitation system, lack of health infrastructure and limited access to healthcare leave populations in a high vulnerability state.

The implications previously mentioned, already critical for the population, get worse when we think about the implications in the mobility systems. This is even more tangible when thinking about peripheric populations with limited connections to resources. Floods can lead to roads interruptions that can leave entire populations isolated, unable to get medical care, food and basic needs until the access is restored.

In addition, the loss of agricultural land for undetermined periods, crop loss due to flooded areas but also for plant diseases, death of animals and reduction in livestock areas, which at the same time led to a drop in production, have a direct impact in the livelihoods of rural population that can lead to malnutrition. [17] In turn, the migration of cold-water fish can have a fundamental impact on the

23 [18] L. Suarez-Ognio, D. Estela-Ayamamani, C. Gambirazio-Carbajal, R. Cabrera y B. Cáceres-Mejía, “Impacto del fenómeno “El Niño” de 1997-1998 en la salud de la población peruana, riesgo potencial para el 2015”

economics of the fishing industry.²⁴

In terms of infrastructure, the impacts of the flood cover all types of construction from educational facilities to individual homes. This can translate in the case of schools into a delay of the educational system and in the case of housing into the formation of social conglomerates in shelters with poor sanitation. [18] At the same time, this involves a series of problematic related to, oppression, insecurity, sexual abuse, physical aggressions, among other social fallout.

Responsible for the displacement of objects ranging from domestic equipment to entire cars, floods are also accountable for the psychological impact that comes after. As Langumier (2008) explains, during a flood a general contamination takes place, erasing the barrier between indoors and outdoors, which is also felt as a loss of protection: “*The transgression of the rules of distribution of the spaces, of the dirty and the clean, of the inside and the outside, threatens this system of protection of the cultural order against nature.*” Translated from: [19, pp. 90-91]

Our homes, culturally assumed as our shelters, are suddenly filled by exterior water erasing the domestic environment of the everyday life. Layers of mud are left once the water has withdrawn, affecting the urban landscape. A necessity to re-establish the border between clean and dirty, interior and exterior takes place. This domestic invader, mud, also associates with respiratory problems due to humidity. The stress and shock of the event can translate after in physical symptoms or even death.²⁵

Furthermore, the flood has also an impact in the survival's ordinary moral dispositions, dramatic circumstances such as the loss of a baby by its mother, the separation between kids and their parents, the rejection of help, are justified after the crisis and stories are reconstructed in such a way, they avoid to share this “moral transgressions” through partial silences of memories that still remain.

24 This happens for example in the case of Peru, the first producer of fish oil and fishmeal, and at the local level, fishermen also see their economic livelihood cut short.

25 [19] J. Langumier, “Survivre à l'inondation. Pour une ethnologie de la catastrophe”

Also, a new identity is created:

The story of an inhabitant is no longer that of an isolated victim confronted with a singular tragedy but is part of a collective experience (that of a village or a flooded region) which gives it a more general value. Through her unfortunate experience, it is the whole of society that is affected. ...The group of disaster victims is constituted by bringing together inhabitants united by the arbitrariness of the damage and divided by the social divisions that structure the village. This shift from the disaster to the victims questions the link between a material situation and the generation of a collective social identity in the case of a territorialized disaster. The paralleling of these two types of narratives shows two different dynamics: the rescue narrative participates in the construction of a victim status by highlighting the drama of the event, while the lament of the losses caused by the flood signals a sense of social relegation through the material loss. Translated from [19, pp. 31,43]

In places where the catastrophe's destruction is still perceived, the people who continue to live in vulnerable places live in a parallelism between the past, the present and the future with respect to the flood and its memory.

Catastrophes, in this case El Niño of 2017, highlights the singularity of a territory, its local political pressures with the mistakes of predecessors and the current conflicts with newly elected officials. Every context is a fractal of the global issues with a unique character. In the case of Peru, located in the second region most likely to suffer from natural disasters [20]²⁶ it seems crucial to attend the problematic of floods and its intricacies in relation to an architecture based on prevention and adaptation to raise preparedness and resilience for the most vulnerable people.

26 [20] ONU, "América Latina y el Caribe: la segunda región más propensa a los desastres"



Hamlet of Chato Chico, "Welcome to the home of the Silva Balcazar Family", 2022 | Lucia Gheresi

Parallel city and periphery

What are the differences between disaster responses in the periphery and the city?

The differences between cities and periphery's during a catastrophic event start with its composition, while cities involve a higher level of infrastructure due to their density and functioning, constructions in the periphery are more spread, low and less densified. Considering that disasters tend to scale according to the human scale it is possible to perceive more catastrophic effects in a city context where more of the built environment is affected and there are more material losses. Therefore, a link can be established where a higher density, such as the one we find in metropolitan areas, involve a slower recovery due to larger property damage and lives taken.²⁷

However, cities also involve a stronger social capital that can push people already in the periphery of society towards a slower recovery due to its lack of social resources. With a higher accessibility, stronger ties to authorities, media diffusion, more basic service facilities and stocked resources, cities also tend to receive more direct and quicker support when facing a disaster in comparison with towns and settlements outside the urban area.

Villages in the periphery risk to be cut off during a disaster due to limited connectivity, forcing them to cope with the effects by themselves for undetermined periods of times. An effective risk communication, a higher physical and social connectedness for resource exchange, cohesion, response and recovery is critical to avoid sever communitywide damage. [3] Despite being "less" the material loss of a house built with earth or plywood in relation to a concrete six floor building, the value of that house can be even greater when it's the only thing that person has; as a society we should stop quantifying damage in relation just to the amount of money, resources and materials involved.

27 [3] D.P. Aldrich, "Building Resilience, Social Capital in Post-Disaster Recovery"

Another difference between catastrophes in an urban and a rural context is the number of phases and their time-frame in post-disaster responses. While a city is fundamentally rehabilitated²⁸, in the countryside the crisis involves more stages. After a catastrophe, small towns or settlements outside the metropolitan area tend to be relocated in areas that lack of sanitation and accessibility, putting victims under higher stress due to poor living conditions during the following post-disaster phases.²⁹ The prolongation of the catastrophe in time, in this sense, is much greater in peripheral areas and includes a factor of changing migration from flood-prone areas to safe areas and vice versa, to have access to their farmland, the basis of their livelihood.

In the case of Piura, several districts were visited and the differences between urban and rural contexts are clear and tangible five years after the floods from 2017.

Although the old beauty of the cities of Piura has been "worn away", according to the residents, five years later the passing of the river is no longer evident in city contexts of Piura, Castilla and Catacaos. Buildings, main squares and houses have been restored and only sidewalks and roads present a lack of maintenance that could be associated with the passing of the river. By listening to neighbour's testimonies, it is hard to imagine how the dwellings first floors were under water or how the tables in the Shopping Center of Castilla floated.

On the other side, in the districts of Catacaos and Cura Mori, in a periphery-rural context, the people interviewed shared a common thread about the disaster's event that went accordingly to a physical damage still present. The homes and buildings turned to ruins, the presence of fallen electrical wiring columns, the sand as a common floor finish and the improvised houses gave the flood a multi-dimensional character, merging in one place the past, the present and the future.

28 This refers, for example, to activities like restoration of access roads, basic service networks that have collapsed and reconstruction of buildings. The very density of the city and its interconnectivity can also encourage a faster rehabilitation.

29 Among the post-disaster phases, we find the emergency response (with immediate relocation), the phase of transitioning from temporary shelter to permanent housing, rehabilitation and reconstruction.



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Disaster management

According to the United Nations Office for Disaster Risk Reduction (UNDRR), disaster management involves “*the organization, planning and application of measures preparing for, responding to and recovering from disasters*.” [21]³⁰ It’s important to clarify that disaster management doesn’t necessarily eliminate the risk but seeks to decrease the impact of disasters by preparedness. The risk, on the other hand, corresponds to the vulnerability circumstances of a community towards the effects of a hazard. [22]³¹

It can be suggested that risk has more to do with society’s decision of control, exposure, surveillance, priorities and moral principles than with natural disasters. Today we live in a society that runs after the disaster, and then waits patiently for the next one to repeat the process. Giving the intensification of risks due to global warming, climate change and the energetic crisis, it is also society’s responsibility to reduce them, avoid to make new ones, care for vulnerable and make them a motor of change. In order to achieve this, there is a need of awareness and planning with the disaster’s effects in mind. At the same time, the responsibility has to come from each individual in relation to land-use to avoid further losses of life and property.

The current disaster management: disaster, response, recovery, repeat, is based on 4 stages with fuzzy limits between them: mitigation and preparedness, that correspond to a pre-disaster planning phase; and response and recovery that come in a post-disaster execution scenario. [23]³² These four steps should be addressed not as a linear process but as a circular one, where mitigation and recovery are integrated and reinforce each other. Despite of becoming more time consuming, the fusion of this phases would allow communities to take risk mitigation strategies during its recovery, examine post-disaster opportunities and reduce resources dedicat-

30[21] UNDRR, “Terminology, Disaster management”

31[22] UNDRR, “Terminology, Disaster risk”

32 [23] D. Contreras, “Fuzzy Boundaries Between Post-Disaster Phases: The Case of L’Aquila, Italy”

ed to preparedness and response. [24]³³

Mitigation is a prevention phase that takes into account all activities related to reduce the negative impacts of a disaster in order to save life, avoid material losses and damage. Despite of not covering a fully protection, it contemplates, for example: the research of risk factors, development of norms and codes for prevention, new building-engineering techniques and stricter norms, relocation of vulnerable population, study of risk-prone areas (such as floods), policies to create public awareness, among others. [25]

Preparedness is an objective of the mitigation process which aims to put up the logistics to manage the emergency during the response towards the recovery. It strongly depends on the accessibility to assets and resources that can be put in place at a local level and *“The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions.”* [25, p. 21] In concrete examples, this phase emphasizes in the good emergency response network, contingency planning, stockpiling of equipment and supplies, etc.

The **Response** is a phase where the catastrophe has already happened, therefore, its center is unique and clear: the affected people under crisis. This phase serves itself from the previous stage (preparedness) and happens during or immediately after the disaster to save lives, reduce health issues, put people into safety and give them assets for basic subsistence. The response phase, also called emergency response is the first step in post-disaster architecture and it's supposed to last a short period of time before more permanent and sustainable measures are established, yet it is known to last longer and overlap with the stage of early recovery.³⁴

The **Recovery** phase will depend on factors such as the magnitude of the negative impacts of the disaster and the specific local conditions. It's target focus, contrary to the response phase, is more

33 [24] Olshansky, Robert B.; Johnson, Laurie A., “Planning for Post-Disaster Recovery: Next Generation”

34 [25] UNISDR, “UNISDR Terminology on Disaster Risk Reduction”

complex given the interconnected issues, the intervention of multiple stakeholders, the development of short-term and long-term measures and the involvement of private and public sectors as well as the affected communities. [24] A formal definition of Recovery is “*The restoration, and improvement ...of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors.*” [25, p. 23] As we can see, the definition already implies the improvement of pre-existing settings and risk reduction activities, relating it to previous phases of the disaster management process. For the recovery phase, pre-established strategies and policies should already give clear institutional responsibilities to take in action in the most efficient manner. During this process, public consultation, awareness and engagement is important to create new opportunities among the touched communities.³⁵

As observed, the phases in a disaster management overlap and interrelate, therefore, a stablished timeframe for each step could mislead stakeholders to address them in an unarticulated way. Therefore, all the stages of the disaster management should be coordinated as an assemble instead of isolating them with unsynchronized level of authorities leading them. Although there is no question of the importance of each planning phase, the fact that prevision leads to a decrease in the impact of the catastrophe in terms of costs and losses, does suggest that greater efforts should be dedicated to the pre-disaster planning phases where the time frame is also less restraint.

Nowadays, the impact of natural catastrophes in our society can not be compared to previous centuries. A flood in the future can reach a scale of impact that we have never seen before due to our increasing level of social complexity. This is why, disaster management in terms of prevention should not be neglected but supported by formal institutional, legal and budgetary capacities. [24]

35 Among further examples of measures during the recovery and mitigation phases are: projects of reinforcement and rehabilitation of existing structures, reconstruction of damaged buildings with higher technical standards, relocation of communities and property, resuming of employment and reactivation of livelihoods, development or reinforcement of cities relationships with relevant state agencies to build social infrastructure, participatory processes, plans development, among others.

Planning

Planning should be a holistic task to do, however, responsibility to enrich it and respect it has to be taken personally and performed collectively. Facing constant and increasing crises, the need for risk reduction planning has to be more thorough, taking into account factors such as climate change and what it means in terms of new or stronger vulnerabilities due to weather and extreme phenomena.

Since every disaster has a specific context that should not be neglected, considerations have to be made in terms of setting (rural or urban), economic incomes, climate conditions, etc. [24] Different to “normal” circumstances, challenges of disaster planning involve; a specific user and their cultural and psychological load; pre-established livelihoods and capacities; the need of fast implementation; the lack of tools and resources such as electricity and basic networks like water and waste; availability of materials; numerous stakeholders; among others.

Disaster planning is a cycle of constant learning and improving that involves the disaster management phases previously addressed. Among crucial aspects of planning for disaster are: the public involvement through participation, research and analysis in order to plan for the most possible scenarios, facilitating a flexible legal framework, an organizational structure, the development and adoption of the plan and finally its implementation. This last phase is the final outcome that people perceive and can provide a new sense of security in a pre-disaster condition or respond to a “new-normal” expectation for a post-disaster recovery case.³⁶

In a daily basis everyone applies certain planning to their lives, however the capacity to project further into the future is not necessarily done by everyone in the same “scale”. Planning for the future could be considered a privilege forcibly linked to having basic necessities and certain standards of comfort covered. The logistics regarding the construction of a new neighborhood or the diversification of its uses is a very different task than the one faced by treating with vulnerable populations. In the testimonies of the affected

36 [24] Olshansky, Robert B.; Johnson, Laurie A., “Planning for Post-Disaster Recovery: Next Generation”

people in Piura, for example, the catastrophe meant for many an absolute cut in their economic livelihood, the loss of their homes, and their relocation to poorly connected areas that make their recovery and development even more difficult until today. For these people in the periphery of the city, the philosophy of "living from day to day"³⁷ translates into a limited short-term planning. Beyond the victim's interests to meet the basic needs of housing and re-establishing their livelihoods (usually related to construction, agriculture and livestock raising) affected people in the case study don't think much further into the future.

This lack of vision raises also challenges for authorities, policy makers, architects and planners in terms of participation settings to gather the community's needs, expectations and priorities to take them into account in the planning and implementation. Further difficulties in this matter can be the tendency to give higher weight to economical arguments over the people's wishes for decision making. [24] In addition, there is a lack of interest/capacity of the communities representants to bring their concerns and requirements to the meetings with authorities. This last issue can be exemplified with a testimony given in the flood-prone area (Chato Grande), where the witness told us: *"Representative, we have a lieutenant but he is not very interested, that is your representative. He also has his municipal people but he does not come. An authority has to look after his people but he is not like that."*

Pre-disaster planning permits to clarify roles and levels of involvement among the community, stakeholders, authorities and local leaderships. This clarification of lines of responsibilities and financial needs can translate in a rapid implementation that keeps the community's interests and expectations while prioritizing and economizing local resources.³⁸ Through planning, the community could emerge after their recovery with a more resilient and sustainable character towards possible risks. However, resilience can be harder to achieve depending on different social, economical, cul-

37 This expression refers to a daily struggle to access work to subsist with daily payments.

38 This fast acting can be seen in an effective provision of shelters due to a warehouse stocking for emergency kits, rapid delivery of basic supplies and services like water and health assets, clear communication lines, waste collecting tools and procedures.

tural status and should not be taken as a straightforward result. In a regular basis, for the most poor and vulnerable people is impossible to achieve resilience in their own. [24] As it is always easier to lay responsibility only on poor and inefficient governments for inefficient recoveries, it is also easy to blame the most vulnerable people for not being resilient enough if they don't fully recuperate soon after the catastrophe occurred. In reality, the recovery topic is much broader and both parts have a role in the matter.³⁹

39 Daniel Aldrich in his book, "Building Resilience, Social Capital in Post-Disaster Recovery" stresses that community's resilience doesn't necessarily depend just on an effective first response from the government but rather in their social infrastructure. Unarticulated responses after a disaster can lead to a delay in providing shelter and resources, which are vital in saving lives and property in the immediate run. However, there are communities that, despite poorly executed first response, have emerged faster than other scenarios where a better disaster management was set on place. After a disaster, resilience strongly depends on the strength of relationships between the affected community residents, their leaders, authorities and potential sources of assistance. However, not even the strongest social network can cover for unpreparedness, reason why, the strengthening of these relationships has to be tackled and promoted in a pre-disaster planning phase



Piura River, 2022 | © ARCC Authority for Reconstruction with Changes

The Actors

When addressing the catastrophe's impact multiple actors come instantly to mind: the victims, the government and authorities, international humanitarian organizations and the media. A coordination between all actors is crucial for an effective response to the emergency but also to settle solid foundations for future recovery and mitigation actions. However, this articulation also involves each actor's hidden agendas, which can go from a local authority trying to attract funding for other infrastructural developments, to NGOs seeking to raise funds competitively with a marketing purpose. When addressing the roles that each actor plays in developing a post-disaster response and sustainable settlements in the future, further reflection should be given to each of them:

The Victims

Victims of the “disaster” take different shapes and scales of suffering. We find them as displaced population, host population, or other non-displaced population but who's property and land can be occupied/endangered or affected. In a post-disaster scenario, we tend to concentrate in the displaced population which are the ones facing a higher and multi-perspective level of suffering related to: psychological damage and future uncertainty; material losses as their homes and lands, which can involve their livelihood source; and damage to their physical health. [26]⁴⁰ Displaced victims tend to not only be victims of the disaster (floods in the case of this paper), but also for being placed in marginal and remote locations that give them little possibilities to get reintegrated.

Post-disaster responses should take measures to assist the victims to take once again the responsibility of their own well-being by becoming self-sufficient and contributing to the local and regional development at the same time. Otherwise, the development of a constant dependency is counterproductive for the victims and helps no one in the long run. Among the most important measures to avoid a cultured dependency is the localization of displaced vic-

40 [26] Sphere Project, “The sphere handbook: humanitarian charter and minimum standards in humanitarian response”

tims in a broader network.⁴¹ By doing so, they can access to local economic activities, and rebuild social ties, avoiding their exclusion and need for constant maintenance. The importance of this factor will be later illustrated by the case study interviews with the relocated victims in the Kilometer 980, where a feeling of abandonment is strongly present among them.

Indirect victims of the disaster are also the host community, often overlooked when settling the displaced population. In rural and peripheric scenarios, the relocation of victims could be an opportunity to improve the current conditions of the host population as well. However, the local population tends to be cut off the benefits of the victim's assistance such as health care, clean water; while facing the adverse effects of a sudden densification, such as: competition for unskilled work, sometimes rising inflation due to the introduction of monetary help and deprivation of already limited services for incapacity. This can lead to potential conflicts and tensions among both. [27] In the case study, as many testimonies confirm, the reaction of the host-community towards the displaced victims after the disaster was a solidarity even several months after the disaster happened.⁴²

Moreover, even though the general response in the Piura region was collective, more individualistic attitudes and external-aid expectations were also present among the victims. Talking to people that was involved in the rescue and emergency response, one of them shared: *"...it bothered me that sometimes we went and we saw men sitting there waiting for their food, but there were many recipients lying around, garbage and I told them: Hey! at least pick up the garbage, order the supplies. Do something! But the people there are very lazy, but the women and children were organized, the old men just watched..."*

The idiosyncrasy and "inactivity" shown by some victims reflects a lack of responsibility towards their state of victims, their com-

41 [27] A. Chalinder "Temporary Human Settlement Planning for Displaced Populations in Emergencies"

42 This common solidary response took the shape of, for example: common pots, sheltering and gathering of basic products for the babies, self-organized missions for displacement and rescue of isolated people, collection and distribution of hygiene assets and warm clothing.

munity and reflects a deficient social organization. For this reason, involvement and participation should be promoted by post-disaster architecture in order to work with the people itself, taking advantages of their knowledge, capacities, while encouraging them to take action.

International Organizations

To begin with, international organizations should focus on assessing victims rather than just providing aid, thus avoiding creating dependency. In order to achieve this, it's important to empower the victims with tools and assets to have decision capacity and freedom. Another important consideration for international organizations is their lack of knowledge of local support chains. Therefore, it is important to identify local social structures and response networks already in place during and after the emergency to strengthen rather than duplicate or undermine them. [26] In turn, this can translate into a gain in resources simply by involving the population. However, this “low profile” assistance can bring difficulties for the relief agencies to collect funding, giving the need of visibility in order to receive investments. This is why, up to this day the development of isolated camps has served also to give a strong and paternalistic image of the victims being taken care of. [27]

At the same time, this need of “marketing of suffering” and diffusion explains the poorer involvement of International Organizations in pre-disaster phases such as preparedness, as few people would like to donate for a catastrophe that might not come. As we can see, the lack of a culture of prevention is also present in the way we conceive our humanitarian support, conditioning it to see the suffering already occurring instead of avoiding it.

The Media

Media coverage means visibility, overall, in a world where technology has advanced to the point of constant connection. The visual image, in terms of funding, translates into investments after a catastrophic event. No surprise then that the higher amount of monetary support come during the emergency response rather

than other phases of the disaster management.⁴³ Further than that, media coverage presents for the victims a bitter-sweet candy.

On one hand, mediatization gives the victims a platform to express themselves sharing their experiences and feel heard. For the most people, and maybe even more for the humble, the media attention and the notion of being seen on national scale can give a sense of pride, recognition and also justification of the actions taken during the disaster.⁴⁴

The strength of the testimony, as Langumier explains "*...lies in taking the position of <witness of the witness>. The very act of testifying allows one to dissociate oneself from one's condition as a disaster victim and from the experience of the catastrophe, by adopting the role of witness to a collective drama.*" Translated from [19, p. 84] This witness condition allows them to look at themselves in relation to the rest and become aware of their own position in relation to the community, helping to create a collective identity and stop being an isolated victim.

At the same time, mediatization allows for public opinion and donors for scrutiny on measures taken towards the population in need. Whether it is just for superficial and even hypocrite reasons such good images for international marketing, organizations and authorities are under the scope of evaluation, which can lead to better living conditions, facilities and services for the affected population. [27]

On the bitter side, the presence of the media can make the testimonies change in order to fit the TV. This leads to an omission of the more personal and private story of the catastrophe in order to privilege the picture before their own word and personal journey.

"The signifying framework built and diffused by the journalists allows the victims to formulate their experience in such a way that it can be understood by an external interlocutor. It is a matter of not disappointing the foreigner visiting the catastrophic village, to whom one predicts the desire to

43 [27] A. Chalinder "Temporary Human Settlement Planning for Displaced Populations in Emergencies"

44 [19] J. Langumier, "Survivre à l'inondation. Pour une ethnologie de la catastrophe"

find on the spot what he saw on television or in the press: the images of the houses soiled by mud, the inhabitants taking refuge on the roofs, the operations of helter-skelter, the water reaching the first tiles of the villas... the presentation of the media documents and the photographs partly re-plays the journalistic staging of the event” Translated from: [19, p. 54]

To conclude, media can be described as “rapacious”, “scavenger”, and “voyeurism”, as Langumier illustrates through testimonies related to the floods of 1999 in Cuxac-d’Aude in France⁴⁵, where the sensationalism of misery brought by the media led the affected population to feel embarrassment and the loss of their image and dignity. The evolution of their daily life, even in harsh conditions, becomes a “public domain” image thanks to the media.

The government and authorities

Facing an emergency crisis puts automatically the government under the scope. In the case study, since the floods are related to a “natural disaster” caused by El Niño phenomenon, governments are less criticized for not being capable of giving protection to the people they are responsible for. However, authorities should still be forced to stop neglecting the crisis roots and tackle its negative impacts.

Moreover, the sustain of a less-dependent victim population also can translate into less investments for the government. Promoting population displacement in coordination with sites where both could benefit could lead to more sustainable development and economic stimulation. [27] Authorities should create opportunities derived from the disaster such as infrastructure programmes for displaced population considering regional needs. This way, public investments could target the displaced victims needs, the host population deficiencies and not only focus on survival temporary settlements that could become isolated villages.

Governments, like other organizations, should assist the people to help itself with a final goal of complete reintegration to soci-

45 [19] J. Langumier, “Survivre à l’inondation. Pour une ethnologie de la catastrophe”

ety, this becomes a harder task if remote camps are promoted far from economic activities for the victims. The greater percentage of displaced population worldwide are not in camps, which speaks about the people's preference of not getting isolated in unknown locations.⁴⁶

Furthermore, the lack of public policies is a factor that generates individualistic attitudes and ignorance, which translates into one of the main factors of the catastrophe, since it leads many people to settle in risk areas in search of better living conditions. Having briefly analysed the disaster management and planning, we see that policymaking becomes a crucial step and an area where good practices related to disaster planning should be strengthen and developed. The legal framework molds up the whole disaster response and has great importance in developing more sustainable and suitable settlements in general and overall, for vulnerable victims.

The Architect

Architects have an increasing responsibility to conceive buildings that are resilient to natural hazards and climate change. When tackling housing, whether temporary or permanent, they are addressing multiple variables related not only to the living space but also security, health, sanitation, access to water and spaces for food preparation.⁴⁷ Thus, an adequate house is a right that is not always respected, specially in underdeveloped countries. In that type of context, the commitment of the architect to improve living conditions is even more crucial and should be even stronger.

The architecture practice has the richness of addressing several fields that go from technical specificities to broader fields related to planning and management, in which not only constructive but also social, cultural, economic and political factors come into play. This is why the figure of the architect also tends to be related to coordination. This coordination, however, should not only

46 [27] A. Chalinder "Temporary Human Settlement Planning for Displaced Populations in Emergencies"

47 [26] Sphere Project, "The sphere handbook: humanitarian charter and minimum standards in humanitarian response"

be limited between professionals and authorities, but should serve as a bridge between the people they are working for/with and the decision making. This commitment to work on behalf of the community's interests and necessities is crucial when facing crisis that can reinforce pre-existing inequalities and deficits. Therefore, architects have the responsibility to give assistance specially to the most vulnerable people with less means to recover by their own.

In order to do this, architects would need to have a broader vision of the crisis and get involved in all the disaster management phases. A limited vision just of the crisis would not be capable of respond in an integral and more sustainable way. Also, a deep understanding of the context, the local materials and construction techniques as well as previous factors of vulnerability is needed. For this purpose, is useful to recognize that projects related to post-disaster architecture share the same basis as a regular architecture practice. Despite of not being frequently learned in the academic field, tasks such as site analysis, planning, design and construction, are also present when addressing post-disaster architecture and relate to the usual line of work.

In order to enrich their interventions even more, the architect would need to adress the building as a cycle, considering the structure's possible adaptations, making it an object that accompanies the development and changing necessities of its users, being resilient in itself. Furthermore, architects should practice to be a motor of social change and development; therefore, among their responsibilities would be to share and teach new techniques and tools that help empower the communities and increase their skill-set to develop good practices on their own.

Over the years, more architects and other professionals have joined humanitarian organizations in order to improve victim's conditions after a disaster while preparing also for possible future ones. Architects and disaster management policies in general have to start designing with the people in the center and working with them instead of "for" them. This way architects and authorities could become a support platform to guide and facilitate the affected populations response to a disaster rather than be inefficient providers.

National Policies

What are the governmental drawbacks of this implications, are they only negative or also positive? what is being built in the region?

With an increasing threat of climatic phenomenon and recurring losses in terms of human life and construction damage, it is vital for societies to go towards a resilient architecture in terms of disasters. In this regard, governments have the responsibility to establish national policies that integrate mitigation measures to avoid future catastrophes rather than limit themselves to the rehabilitation and reconstruction of property damage.

In order to continue de-constructing the catastrophe, the following topics will be analysed to see their relation to the disaster cycle on the specific site: First, we will address the mitigation-recovery Program “Reconstruction with Changes”; second, interviews with workers of the Regional Center of Emergency Operations (COER) of Piura will be shared for insight on preparedness and emergency response. Finally, the current housing policies will be discussed and the social housing project “Vive Castilla” will serve to analyse the government’s housing offer in the area.

Program Reconstruction with Changes

When talking about the program “Reconstruction with Changes” to mitigate future negative impacts related to El Niño phenomenon in Peru, a feeling of expectations and hope is commonly shared. First presented in September of 2017, the study starts by recognizing the current financial capacity of the government to develop this program, differing to previous years where risk management, prevention and mitigation mechanisms have failed to be adopted effectively. Just after, it adds that investment in preventive measures is only 10% of the cost of post-disaster reconstruction [28, p. 4]⁴⁸, which emphasise the tendency to address the issues once it’s too late, lacking of a culture of prevention.

The main objective of the Integral program is “*to rehabilitate and rebuild the physical infrastructure damaged and destroyed by El*

48 [28] Autoridad para la Reconstrucción con Cambios, “PIRCC”

*Niño Costero at the national level, also contributing to restore the welfare lost by the most vulnerable social groups, especially those who lost their homes and livelihoods, and who had to move away from their usual places of residence as a result of the damage caused by the rains, floods and mass movements (landslides or mudslides)."*Translated from: [28, p. 6] Reading this, we recognize that the Integral Program aims to tackle the phases of mitigation and recovery, starting with the living conditions problematic of the most vulnerable people, as for example the ones living in the periphery of cities in isolated shelters or flood-prone areas. However, contrasting with testimonies of professionals and the local people regarding their life-quality five years later, despite the good intentions of the Integral Plan, the execution still shows a lack of political capacity of decision making to execute it.

Through the creation of a leading authority and the involvement of ministries, regional and local governments, it is intended that the implementation will be carried out locally. Yet, due to lack of implementation and management capacity in local governments, the interventions end up being mostly developed by the regional or central government.

Based on the material damages reviewed by municipalities, regional governments and the Institute of National Civil Defense (IN-DECI), the Piura region is intended to have the greatest amount of investments allocated to cover expenses on agriculture, education, roads, sidewalks and bridges, health facilities, sanitation and housing. [28, pp. 14-20]

In the case of Housing, in general terms, different subsidies are contemplated depending on the state of the house and weather it is or not in an unmitigable risk zone. For houses in a safe area or mitigable risk needing for rehabilitation through reinforcement a budget of S/. 15'000 is allocated (4.14% of the cases). For collapsed houses with the same site conditions, representing 93.03% of the cases at the national level, a budget of S/. 22'072.5 is given for reconstruction. Finally, houses collapsed in unmitigable risk zones (only 2.83% of the cases), families are given S/. 60'000 for the land value, urban habilitation and housing construction of a dwelling of around 40 m² of roofed area for multi-family housing with two bedrooms, a multipurpose space and a bathroom, as

minimum rooms. [28, pp. 22-23]⁴⁹

Given the large scale of the Plan, a government-to-government agreement has been installed with the United Kingdom. In overseeing this, teams such as Arup's UK Delivery Team (UKDT), Mace and Gleeds collaborate with national authorities to apply international best practice to the rebuilding of resilient and sustainable facilities and infrastructure. [29]⁵⁰ Nonetheless, the international agreement is presumed to exist in order to avoid theft of significant capital after a long history of corruption in the country. The integral Plan, supposed to be finished by 2021 and with possibility to extend of a year is still in process and facing a political crisis that difficult its progress.

Up to date, just in Piura the government has invested around S/. 5'100 million in different sectors. [30]⁵¹ Following the local people's testimonies, there is a recognition of several new buildings been constructed, specially related to schools. On site, new facilities related to childcare or schools can also be appreciated. Furthermore, the rehabilitation of the main road that crosses flooded prone areas was addressed and criticized of being just a cover in one of the resident's statements. However, what's most disturbing and is highlighted by professionals involved in the Integral Plan Reconstruction with Changes, is the order of implementation. Buildings such as schools, health centers and even houses are being built first; while infrastructure such as defenses, drainage, natural infrastructure and other measures to protect against floods and landslides at the territorial level have not yet been implemented and are nowhere near to be built. This results in a population still at risk with the addition of important investments equally vulnerable.

49 The complete integral Plan of Reconstruction with Changes can be found in [28]

50 [29] Mace, Media centre

51 [30] ARCC, "Más de S/ 5,100 millones se han ejecutado en obras de Reconstrucción con Cambios en la región Piura"

COER Disaster Management

As for the disaster management related to the phases of Preparedness and Response, it was also intended to get familiar with the Regional Center of Emergency Operations (COER) of Piura to understand their involvement during the catastrophe:

The COER is a public institution in order to tackle preparedness and response measures in face of an emergency.⁵² Through social networks, the COER gathers, processes and shares information on the development of the dangers and then the emergency, coordinating all the institutions involved in the response. Also, it coordinates with public entities to cover the minimum needs of the population and assists in decision making by providing processed information to authorities and managers of other Emergency Operations centers. [31]⁵³

Talking to the technical secretary of COER-Piura, he explains the permanent connection with the capital, which speaks of a constant dependence on the central government:

“On a daily basis we contact Lima [the capital of Peru] through the radio, and we report if there is some kind of emergency or we issue a weather report, Lima responds to us and then we issue a daily report 3 times a day at 10:00, 16:00 and 21:00 as it happens.

For example, in the case of a flood it is not something, let's call it "fortuitous", it is something that we were already expecting because we are seeing that the river is rising, so we are already alert with the authorities of the area and we request information. For example, what do we do, we ask for information every 6 hours and daily: Tell me how the river is doing: how the river is doing... there comes a time when they tell me: it overflowed, and then we act... Then we communicate with the

52 The COER functions are related to activities during the phases of preparedness and response such as: Promoting and facilitating the delivery of humanitarian aid for the victims; monitoring, compiling, updating, generating and publishing timely information on hazards, vulnerabilities, risks, emergencies and disasters, as well as the existing resources and capacities to cope them.

53 [31] Oficina Regional de Seguridad ciudadana, defensa nacional y COER, “Centro de Operaciones de Emergencia Regional - COER – Funciones”

entities that have to work, for example, INDECI, then we ask for road interventions... For example, there is an overflow, there is a road blockage, we have to unblock it, coordinate with the authorities that do this work so that they can do it.

Suppose an event occurs. All the technical secretaries, both district and provincial, carry out the damage assessment which is entered into the national system. Once it is in the national system, here in the Operations Center, I, as technical secretary, gather all the information on the damages, I communicate with the head of the region, the president of USACEC, the head of Civil Defense and bring together the platform that is integrated by the police, the army and the agricultural, transportation, housing, etc. sectors. And we met. In that meeting, I as technical secretary (regional) I am the person who advises the governor. And I tell him, you know, Mr. Governor, as a result of the earthquake this and that; he asks me how we are doing in terms of damages, and I tell him how many houses are affected, how many irrigation canals were affected, roads affected, and so I explain everything, and once I explain everything, I mention the number of people dead, people affected and I give an account of everything, because everyone communicates with us and they send us the information... and that's how everything is done, everything is coordinated through our platform to give immediate actions..."

Havin the function of supporting the response and rehabilitation through communication channels, the COER sets up meetings with all the sectors involved according to the damages stipulated in the emergency declaratory. The response goes accordingly to different levels of institutions, which relate to the negative impact of the disaster and therefore the degree of severity, the institutional capacities and the extent of resources put under disposition to cope with the emergency.

When asking about the planning for disasters such as El Niño phenomenon and the type of emergency kits given to the people after a repetitive catastrophe such as the regional floods the testimony shared:

"In the plans it is already determined where they are going to relocate ... for example, the river has overflowed and the support of the population is needed. Houses and some things

have been destroyed, because there are points where the houses are precarious, then a place is determined and from there the tents are set up and the food is considered and everything related is given to them.”

Referring to the time-period that the support is given the technical secretary added:

“That depends on each regional government, because each one has a responsibility, they are in charge, for example, of immediately requesting suppliers to present their standards and these are responsible for 200 or 300 daily rations or less, but for all those who have been evacuated. And also, to the people who have been completely harmed, the support we give them is of, calamine roofs, plywood panels, shovels, everything to support them...But the COER does not deliver directly to the people, we deliver it to the municipalities and they deliver it to each one in their area.”

Speaking with other workers in the same institution such as the person in charge of the warehouse of the COER-Piura he said that according to the damage analysis they calculate the needs and the amount of people affected. For the harmed victims they provide an emergency kit that consists in calamine sheets, plywood panels, a mattress and blankets. However, when asking about the capacity to address relocated people in the case of that specific warehouse, he added *“In the past, we used to buy for 500 families, we are talking about 500 kits, but lately, due to the price increase, we are not buying that anymore.”*

The Characteristics of the kits according to the worker consists on temporary assets that can last between 2 to 3 months due to the climatic conditions and would cost approximately S/. 1500. The visited COER warehouse is one among the other 17 in the region that get restocked annually.

Problematics already mentioned before in the text can be confirmed by workers that have seen the disaster management over the years in several cases of El Niño Phenomenon. Among them, one professional dedicated mainly to the health sector shares his preoccupations regarding deficient investments:

“While the upper Piura stays isolated, we continue to build roads without drainage, we continue to cut down hills to

build a road knowing that tomorrow it will collapse. There are several things that have not been foreseen and in Piura we know that when it rains, it rains well. And yet we continue to build flat roofs, we do not even make a slope to drain or a cover to protect me. Before, situations like these may have worked, but I hope that in 200 years from now we can improve. [He laughs frustrated] We still cannot say that since the El Niño phenomenon of 1997-98 a whole plan for reconstruction was made...there are no consistent works that can prevent the same thing from happening, we still have the problem of urban drainage, the problem of the river, blind basins, the problem of riverbed management.... The authorities come in with a picture of what should be done, but in reality, nothing is done..."

Examining the testimonies from the COER in contrast with evidence on the field, there is a confirmation on the lack of local and regional implementation capacity and budgetary constraints. Furthermore, the acknowledgement of insufficient assets for victims during the emergency reduces them to a number and leaves them neglected in face of the next disaster. The COER shows a clear line of responsibilities and protocols to respond to the emergency, however, leaves in evidence the lack of attention that the National disaster management gives to already existing local networks that are closer to the people and ready to help. As it can be exemplified through testimonies and developed in Aldrich's book "Building Resilience" [3], social resources can be equally helpful as material resources in order to give an efficient response and build resilience among the communities.⁵⁴

⁵⁴ In parallel, worldwide, several wave activity monitoring techniques have been developed that could provide 6 months lead, valuable time for particularly vulnerable coastal and island communities in vulnerable parts of the world. [49]



COER warehouse, 2022 | Lucia Gherzi



COER warehouse, 2022 | Lucia Gherzi

Housing policies

Among the Housing policies, as we have seen, the Program Reconstruction with Changes tackles the housing issue according to their location in pro-flooded areas or not. Plans related to reconstruction were launched by the government in order to invest in social housing for the victims but also based on the demographic growth of Piura. The projects are conducted by the Ministry of Housing through the Program “Techo Propio” (Program Own Roof). Speaking with Jose Hernán Velasquez, a local engineer and owner of a construction company, he commented:

“At the housing level they were handling it with programs such as "Techo propio" (Own roof), there are several modalities. I know about Cura-Mori, they took them to the zone of kilometer 980, there are real estate projects, but what was the problem, I am telling you because the workers told me about it. They were offered modules and buildings and apartments. So, you were going to give the rural people 50 or 60m2 houses, but the rural people are not used to that because they raise their animals, they are used to having their barnyards where they raise their chickens, goats, pigs, and they could not do that in a module, so most of them did not accept, because it was not convenient for them. They have large plots of land of 500 or 600 m2 where they have their houses and yards. That must be difficult or impossible for the state, imagine the magnitude of the land, and imagine if they are in buildings, it is impossible for the rural people. The buildings would have been delivered with all the facilities, “Techo Propio” would have given everything for free. But the people of the countryside could not accept them, they cannot live like that...”

[When asking about who is in charged of the decision making among the people regarding these projects he added] *“They have their organizations...but as I said, most of them have not accepted...they had assigned areas where they were going to build with the residents, but they are not moving forward because the people don't want that, they do not want a 60 or even 80m2 lot. They don't even build the whole fenced land; they just give you a module. That is why it has not worked.”*

According to the Program Reconstruction with Changes, in the district of Catacaos, which takes part of the case study area, 3'173 modules should be destined to affected people from the floods but they are still not finished. Five years later, definitive housing for the people living in some areas of the kilometer 980 is not yet available. This is the case of the human settlement of San Pablo with around 640 families (2,740 victims) and other human settlements like San Pedro, Jesús de Nazaret, Santa Rosa, among others with another 5,000 victims. [32]⁵⁵

“In some places near the cities, like in Catacaos, they [referring to some residents] have accepted and have given them their modules, punctually, and facilities... but not to the people who have come from San Pablo, Cura-mori, Pedregal, Chato Chico, not to the MASS” emphasized the engineer Velasquez.

Among other considerations that don't seem to be made by public housing projects is the size of the families, that tend to be large and intergenerationally united.

“Vive Castilla”

Vive Castilla is a social housing project that is not intended for flood victims. However, it is practically identical to other reconstruction projects for displaced population, such as the complex "Una Sola Fuerza". With the only difference being the construction materials (housing modules for victims are made of brick instead of concrete) “Vive Castilla” will serve as an instrument in this text to analyse the problematics related to the government's housing proposals that are repeated in further projects for affected people. Among the main deficiencies we find a lack of accessibility and mobility, reduced plot and housing module area, lack of public facilities, etc. In relation to the victims, these problematics are even harder to overcome due to their needs and livelihoods and keeps them from accepting these projects as a reconstruction solution.

Entering the complex “Vive Castilla” we notice the repetitiveness in the housing modules that cover 25m² of the 62m² of the par-

55 [32] El Comercio, “Reconstrucción en Piura: las obras pendientes tras daños por El Niño costero”

cel. The modules are initially received with one single floor where there are two bedrooms, a toilette, a reduced open kitchen and an exterior lavatory in the back garden. The modules are allowed to be extended up to three floors with reinforcement. When entering the different rooms, a sensation of smallness is instantly perceived and contrasts with the larger living spaces in the houses built by the people themselves. Despite of being constructed in more resistant materials such as concrete and brick, and having the network basic facilities the modules still don't give the "dignity" that housing projects tend to promise in recovery phases after disasters for affected people or to any other person willing to invest in buying a house of their own.

Other than the surface, a strong problematic relates to the accessibility, this becomes even more severe when speaking about the affected families, supposedly the center of social projects alike. The distance from the fields to access the land, source of their livelihood is far even with a private transport. In addition, public transport does not connect the complex due to its distance from the main roads or their location in highways where the circulation of public transportation is very limited. The lack of services such as commerce, pharmacies, day care centers is also evident, finding only a few closed businesses camouflaged among the houses. These factors leave the housing modules as isolated islands dependent of the car or highly expensive taxis, that the humblest people have not access to.

When walking through the complex social squares with kids' games are appreciated. However, despite of the aggressive desertic climate there is no sun protection, with the exception of few pergolas over bancs. As it happens in all the project, the public spaces and the streets are empty, giving the feeling of a ghost town as it happens also in the flooded areas next to the river. For the formal characteristics of the modules a strict repetitiveness is given by the uniformity of the facades. The dwellings are separated in sectors and differentiated by the color of the paint, the only tool in order to localize one self in the project and differentiate the own house from the neighbors. The monotony of the streets, makes even more evident the facades of the houses that begin to be personalized by their owners.

A need of differentiation from the neighbor is imposed through the appropriation of space and translates into different colors of curtains, ceramic finishes, designed railings in the entrance or the windows, metal doors and extensions of the houses.

In 2020, the Ministry of Housing exposed its intention to develop new phases of this Project, which could be extended up to 25 hectares and be destined to families with low resources. [33] This raises more questions about the connectivity of the housing complex with the rest of the city, the lack of services in the proximity, the inconsistency with the target users and the impact over the desertic land. Despite the mentioned deficiencies, during the site visit conducted in 2022, we corroborate that those further stages of the project have been constructed and sold out, which reflects the lack of adequate housing projects at affordable prices, which translates into a complete booking of projects like the one presented.

As a result of the mentioned problematics, we observe that the housing modules end up to be taken only by young people with private transport, police forces and other state institutions rather than the most vulnerable families that need to access better housing conditions the most.⁵⁶

56 This comment was initially made by Engineer Velazques in his interview



Social housing Project Una sola Fuerza, 2020 | © Joomla!



Social housing project Vive Castilla, 2022 | Lucia Gherzi



Social housing project Vive Castilla, 2022 | Lucia Gherzi



Social housing project Vive Castilla, 2022 | Lucia Gheresi



Social housing project Vive Castilla, “Sold”, 2022 | Lucia Gherzi

Local conditions and materials

Local conditions:

The emergency is always staged in different scenarios. Each disaster and its impact are specific to its local conditions and people. The case of Cura Mori, a district within the study area in the Low Piura, will be taken for the following analysis as a representative case. [34] Regarding the climate, we find a desertic ecosystem with average temperatures of 22° that can reach 34°C in the summer months and 15°C in the winter months. Extreme temperature variations as result of climate change and future natural hazards should be considered in post-disaster architecture as in general practices. Regarding the rain cycle, this is seasonal and the humid season lasts from December to April.

The population is mostly young, 76.4% under 45 years of age, accurate with general statistics of Piura. In the flood prone areas that were visited, the people’s economical incomes were mostly based on alternative crops, technical-productive livestock farming and construction labor. As it’s usual in peripheric and rural areas, single-family dwellings predominate in the area with 92% in the case of Cura Mori and the families tend to be big.⁵⁷

Materials and construction techniques:

In terms of materials, one can analyse in the Cura Mori report the materials used for dwellings in the area:

Material / Constructive technique	Number of houses
Quincha (Wooden framework and grid filled with earth and vegetable fibers)	3671
Brick and concrete blocks	827
Adobe- Earth brick	566

57 [34] Cura Mori district municipality, “Plan de Prevención y Reducción del Riesgo de Desastres. Distrito de Cura Mori 2020-2022”

Plywood /calamine sheet/ Plant Fiber mat	534
Wood (Pona, Tornillo, among others)	93
Stone and mud	9
Earth (Tapia)	3

Table based on data from Cura Mori District, 2020 [34]

“Quincha”, suggested as the most used technique, is a local traditional constructive technique that consists fundamentally on a wood framework covered by mud mixed with vegetable fibers and dried with the sun. Among its properties is the stability to humidity variations, flexibility to absorb seismic forces and its lightness. These characteristics allow to use it in soils with low bearing capacity. Also, it’s production requires only basic tools and equipment. [35]⁵⁸

Among other characteristics took from the Cura Mori district, strongly perceived in rural areas in general, is the use of calamine roof sheets. In Cura Mori, this material represents 77.4% of the roofs.⁵⁹ In the Peruvian context, calamine sheets are an example of how current construction practices have abandoned traditional materials and techniques in accordance with climatic conditions to adopt solutions sold as a symbol of progress and modernity. Furthermore, nowadays one can see that the architecture produced in the capital is replicated in all parts of the country despite their differences in environmental conditions. The influence power of the city and its urban lifestyle on the periphery and the rural area is materialized in standardized buildings that don’t respond to their site. In addition, this copy of the city’s modern architecture translates into the construction of housing complexes with minimal areas that don’t respect the space needed by their users to perform their regular activities, economizing on each m2 of built area as is done in the capital.

58 [35] M.E. Lacarra Córdova, “Autoconstrucción de viviendas en quincha mejorada para damnificados del terremoto en el sur del Perú”

59 [34] Cura Mori district municipality, “Plan de Prevención y Reducción del Riesgo de Desastres. Distrito de Cura Mori 2020-2022”

Regarding other materials, in the settlements of displaced people, the houses are almost exclusively made of reed (an abundant material in the area), plywood/chipwood, and calamine. In the case of flood zones, new dwellings are mainly made of plywood/chipwood and calamine or fiber mats, indicating that they have been rebuilt after the floods of 2017. However, the pre-disaster homes were found to be generalized brick ruins or isolated walls. Moreover, in the case of houses that are assumed to have been of quincha or adobe, only their foundations are still relatively visible.

Regarding dwellings provided by the government in affected areas we can address the temporary and the reconstruction modules.

Temporary prefabricated modules were distributed in small quantities. During the visit on site only one was found. These temporary shelters according to the government requirements⁶⁰ are meant to last 3 years and have 18m². The space distribution is in three rooms with a minimum height of 2.30m on one side and 2.90 on the opposite to have a slopping roof. According to the requirements from the governments specific materials are not stated. However, usually used materials are wood frameworks for the structure, drywall panels and calamine roofs. The module considerate three electrical connections, however, displaced populations tend to be relocated where there is no electrical network. Its composition is intended to be easy to assemble and disassemble in case it needs to be reused or relocated.

Furthermore, the reconstruction modules proposed by the government, found in projects such as “Una Sola Fuerza” have always the same area and space disposition. The brick module can be extended up to three stories, which is why steel is left on top. However, this leads to oxidation that can impair the quality of the concrete. The lack of tiling and painting on the lateral sides makes its standardized character noticeable, leaving two exposed brick walls even though it’s construction is in a single plot area with no future neighbors.

60 The government requirements for temporary shelters can be found in [50]



Quincha wall in the hamlet of Chato Chico, 2022 | Lucia Gherzi



Quincha system in the hamlet of Chato Grando, 2022 | Lucia Gherzi



Old brick house in the hamlet of Chato Chico, 2022 | Lucia Gheri



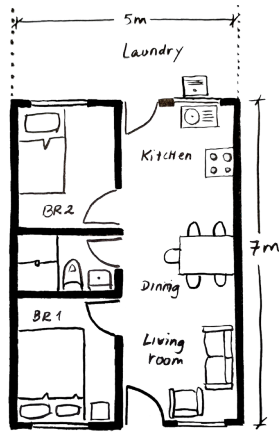
Transitional housing in the new settlement of
San Pablo, 2022 | Lucia Gherzi



Old church in the hamlet of Chato Grande, 2022 | Lucia Gherzi



Church in the new settlement of Jesús de Nazaret, 2022 | Lucia Gherzi



Government's housing module redrawing by Lucia Gherzi



Government's housing module in the hamlet of
Chato Grande, 2022 | Lucia Gherzi



Fiber mat wall in the hamlet of Chato Chico, 2022 | Lucia Gherzi

CHAPTER 2

II A multi-perspective Story

How did the population experience the floods of 2017? How does the catastrophe still affect them today?

On March 27 of 2017, at dawn, the Piura River overflows as a result of heavy rains due to El Niño phenomenon, affecting around 375 thousand people and leaving around 90 thousand displaced victims in this region. [36]⁶¹. The case study, representative of the coastal zone of Piura, included visits to the districts of Catacaos and Cura Mori. In order to have a more global perspective of the catastrophic effects here we present some of their stories from 5 different angles:

First, we develop the perspective of re-localized victims in new settlements; second, the point of view of a host-population to evaluate the impact in an existing village; third, the insight of a person still living in a flood-prone zone; fourth, the perspective of an already formal settlement developed after the floods of 1982 for a travel through time to a possible outcome for the current settlements, and finally a fifth angle of a local engineer that was directly involved in the rescue process for a broader view of the flood events and its impact.

Re-localized victims

In the study area, we find human settlements as a result of people's migration to the kilometers 975- 980 of the Panamericana Norte highway. Victims of the floods regrouped in new settlements with religious names, ironic given the feeling of abandonment. Among them, visits were conducted to the “new” establishments of San Pablo, Jesús de Nazaret and San Pedro to talk to the local people.

In their stories a common list of current problematics repeated constantly: the lack of basic services such as water, electricity and waste, the absent of health facilities or their limited functioning hours, accessibility and mobility issues, un-regular or lack of work

61 [36] INDECI, “COMPENDIO ESTADÍSTICO DEL INDECI 2017 – GESTIÓN REACTIVA”

places; insecurity and in one case legal problems with a company for the properties. A generalized social unrest is also strongly perceived when talking about the authorities, other settlements and the private company.

When asking about the floods of 2017 and the emergency response a constant timeline was shared among all the testimonies:

In view of the progressive rise of the river, people watched the river sides being reinforced with sacks by the authorities. However, due to previous floods where its impact was controllable, they adopted a confident attitude and did not go out in advance until the radio stations began to warn that the river had officially gone out.

In San Pablo, a group of men between the ages of 34 and 65, neighbors since their previous settlement told us:

“It was in 83, that we, that is to say that before 2017, we also had a flood but it was not so strong the outbreak, that is to say that the water just hit us over here [he indicates the ankle with his hand] so we were confident, in this 2017 we thought it was going to be the same. But it was not, it was worse, it was worse and we got out, we got out with nothing, just as we are, we got out. The water was already close to us, we were running, it was close, to get out to where we are located today.... It was during the day, at about 10 o'clock in the morning, if it had been at night, it would have been worse; imagine that, there would have been deaths, because the children, the elderly, them more than the rest, thank God it was during the day... By 2017, we curious would go to the river and see that they were reinforcing it with sacks, that is, once we went and it was already about here [indicates a height up to the waist] the radio stations began to warn us that it had already begun, that it had already broken, alerting us...

...we went out, on foot, on the run, we left, just like that we left, without the things that were lost, everything was lost... We were in tents for almost a year, a year, because it took them a year to give us a parcel of land, we had to clean it all up [referring to the terrain in the 980 km where they were left after an initial regrouping in a common shelter in the same kilometer] so that they could give us a land, a plot of land... We have built, we built ourselves.”

When talking about food and basic necessities, they told us they were supported by INDECI (Institute of National civil defense) during the time they were in tents. When the land plots were assigned, the support stopped abruptly until today. Referring to the plastic tents, residents said they "dissolved" and broke under the sun and wind due to the desertic climate of the coast of the region. Among the institutions that helped them from early on, they repeatedly mentioned INDECI and the ONG Save the Children, in some cases religious institution and The Red Cross also were involved in the testimonies. Nowadays, among discussions between them they express a constant feeling of abandonment in all the settlements of the area: *"Nothing reaches us here, we are the ones who are harmed, not even work, right now we are out of work"*.

To compensate the lack of basic networks for water, it is brought in by truck and stored in tanks that are now normally found indoors due to theft. According to the local people, the number of families go from 40 to 100 depending on the settlement and there is a casual surveillance among them. The absent of electric energy has not only an impact on the security but also a strong social impact inside the family, testimonies tell how children of several residents do not live with their parents in order to have facilities to access to classes and do homework in a context of technology dependence strongly brought by COVID 19. In addition, the distance from the educational center represents a cost too high to travel. This factors, compounded by the absence of work, lead to a distancing of families.

In San Pablo, the neighbors start explaining each others cases to illustrate us their every-day difficulties:

"Their children study, I also have a brother whose children study and here there is no educational center for them to study. And for the tickets to go to Pedregal it is very expensive, so they stay in Pedregal. And there are schools that are still doing it virtually, because of the electricity too, but here there is no electricity to charge a cell phone...For us to go to Pedregal, it is S/.15, my wife S/.15 and my son S/.15, that's S/.45, so, I go to visit my mother once a month."

In San Pedro, a group of women, households, confirmed the difficulties to get out of the settlements and comment on the aggressive climate conditions that aggravate the situation:

“-We have to think about going out.

-Aha, and otherwise we have to go out earlier so we can walk with the coolness.”

People's vulnerability relies deeply in their livelihoods, work among men in these human settlements is mostly in the construction field, while women tend to dedicate to domestic tasks and the raise of animals, as well as older people. The sporadically character of work in construction leads these people to work in agricultural fields also in an un-regular way to “live by the day”, while the young population is hired in larger agricultural production companies. When discussing their current work situation, they said: *“We, for example, I am a construction worker, that is, a brick-layer. When there is no work, the farm, but right now we don't even have the farm, so we go to look around, we are going to look around for a couple of days to at least eat, right? Right now, things are very expensive, very expensive.”*

The urban disposition is arranged in rows of houses resting directly on the sand, leaving the space for the roads in the future to be paved. There is a lack of service networks and health facilities. Residents in the area speak about the danger for their animals and for themselves to be bitten by animals common in the desert such as snakes. Asking about a health center the men commented:

“We don't have one in our shelter, but we do have one for the other side. We don't have anything here, not even a suitcase, we don't even have a first aid kit, we are abandoned here, that's the reality, we are abandoned. We are approximately 30 families. 40 families living here.

Because look, right now, for example, it seems unbelievable, at night, there are snakes, snakes, snakes, last night my wife was almost bitten by a snake. There are snakes, and therefore to go out, there is pain so we practically would die here because we have nothing nearby...A serious bite and you die here, because there's no mobility, not even to go out”.

Concerning the materials and constructive techniques, the houses are self-built by the residents and don't provide much protection against the outside climate. The construction is usually based on a reed structure, predominant material in the area, and closed with exterior plywood walls and calamine roof sheets that are mis-

treated or carried by the wind. Interior separations are made with reed, fiber mats and exterior areas such as the ones destined to services and animals are enclosed with dense mats and pieces of wood.

In San Pedro, a group of women, that share a common house among several families, added:

“-Sometimes there are strong winds, and this is broken by the air [refers to the calamine roof sheet], this is carried away by the air.

-A big wind comes and the calamine sheet is ripped away.

-We go to bring them from far over there when it falls.

-Others are already damaged, because of the shock when they fall, no longer work”

As for the houses, even with local materials with a very low performance still provide a sense of proper space in the interior that contrasts with the ongoing tendency in cities to build apartments with the minimum functional space to explode the saleable surface. Large rooms are in display, sometimes with no clear definitions between the private and social spaces. The enclosures provided for the animals tends to be an extension of the house through an interior courtyard or have a direct access while remaining an adjacent space. Space in general is treated according to each family's needs, size and livelihoods, rather than being a fixed recipe based on profit-based solutions.

The resistance to preserve a way of life that involves this culture of space beyond the bare minimum can be materialized in the legal problems between the informal human settlement of Jesús de Nazaret and a private enterprise, owner of the land where they are installed. Two years after the floods, in 2019 the enterprise signed an agreement with the Ministry of Housing for the urban habilitation and construction of definitive housing on the land located at the kilometer 980, however the project demands the movement of the families already established since 2017 to other land plots with smaller areas [37]⁶².

62 [37] Cutivalú Radio, “Damnificados del Km 980 reclaman porque serán reubicados cerca a torres de alta tensión”

“We had meetings with the company for about three years, looking at the housing project, and we agreed and it was approved with the mayor of Cura Mori. So, we trusted the mayor. Then the project was approved and they changed the plans. They did not make the plans as we had agreed...We have problems with the area of the lots because they are not respected. Before when housing came [Referring to the Ministry of Housing], when COFOPRI came [Organization of Formalization for Informal Property], we set it up the way we are [speaking about the lots and their disposition]. There it was with us; the company was with us. We worked on the project. The project, 300m2, only 300m2 the housing project and we have lots of 450, we already have it plotted and that is what we do not agree with. And some of them agreed, that's why they made separate modules.”

Said one of the leaders of the human settlement that still waits to see how the authorities proceed with the project. Before the agreement between the government and the company, the displaced victims were constantly moved and changed in site, given their informal settlement. This instability regarding the victims location makes us question the lack of planning of the designated areas for evacuation in case of emergencies, which translates in more collective stress due to constant moving and uncertainty.

Moreover, the lack of responsibility from the government, it's lack of continuity, un-articulation and negligence in general is also materialized in public investments, in the settlement of Jesus de Nazaret, that would go to waste if the people are moved in favour of the company. Furthermore, the constant struggle to finally settle might also explain the feeling of belonging they have developed since the agreement and therefore their lack of will to compromise and move.

“The first meeting of the commitment was on November 28, 2017, I have that document, there was the regional government, there was Housing [Ministry], the municipality and us. At that time was the other mayor, Macario Silva, and he accepted, he even signed the agreement, which gave us the pass, because we had problems with the company, they always kicked us out, they always threw us out. With that peace that was made we were calm, there were no more disputes,

there was nothing. We had a discussion with their engineers, because of the housing project, and in the end, they approved the project in their own way, and so far, we are still working on it.

There was a problem in Santa Rosa. Qualification, whoever did not qualify was taken out of there and thrown out, further away. They had their little houses there. They would throw them out in the same place but further away, they would change them. And now they have agreed to move in, to change, but now, as they say, we have to see if it is a reality, they are still promising them things.”

On the other hand, from another perspective, their previous experiences been forced to moved prove them capable of doing so. Also, other testimonies indicate the assemble of the house in a period of around 7 days. Thus, their posture of resistance makes us see their true priorities: “*We want it to be legal, once and for all to be done with it*” said the leader of the human settlement of Nazaret that is not willing to compromise in any way with the company’s conditions, wanting to keep their lots as they are now whatever it takes, even the informality they are so tired about.⁶³



Neighbors in the new settlement of San Pablo, 2022 | Lucia Gherzi

63 Further information regarding the authority’s response to this legal case can be found in [37]. The current mayor of the district indicates that there is a signed agreement registered in public records since 2018 and they have to give the space accordingly. When questioned about the peoples complains he blames the unarticulated manner in which the coordination was handled by previous authorities.



Group of women in the new settlement of San Pedro, 2022 | Lucia Gherzi



Group of children in the new settlement of Jesús de Nazaret, 2022 | Lucia Gheresi



Leader of the new settlement of Jesús de Nazaret and my trip companion
Johnny, 2022 | Lucia Gheresi



Kitchen in a house of the new settlement of
San Pedro, 2022 | Lucia Gheresi



Animal area in a house of the new settlement of
San Pablo, 2022 | Lucia Gherzi



Bedroom in a house of the new settlement of San
Pablo, 2022 | Lucia Gherzi



New settlement of San Pablo, 2022 | Lucia Gherzi



Public investment "*Integral attention Center for the Children*" in the new settlement of Jesús de Nazaret, and my trip companion Jesús, 2022 | Lucia Gheresi

Host Population

Host populations after catastrophes are catalogued as indirectly affected populations. However, interview with Monica Rumiche, director of an Educational Center in Catacaos, gives certain insights about the situation in the original village of San Pablo in the kilometer 984. Her testimony helps understand the impact of migrations product of catastrophic events and the problematics years after. Among some of these issues she addressed, the lack of sufficient capacity in education facilities, lack of health infrastructure and limited basic network facilities, especially the water service and pumping network, worsened by the COVID 19 context.

Similar to the new settlements of displaced victims, the urban disposition of the houses in San Pablo is in rows and stand up directly over the sandy terrain next to the new highway. The dwellings usually have an overhang at the front providing a semi-public space before entering the interior, possibly for future commerce use. The materiality of plywood, calamine roof sheet and reed remain a recurrent feature throughout the young towns and human settlements. Houses partially built with confined masonry are a minority. The closeness to the highway gives the population access to transport to arrive to the city, however public transport remains limited. There are no sidewalks nor public spaces for the community. Vegetation is limited to trees such as Algarrobo, Molle or Huarango, which grow typically in the Peruvian desert.

Among the one-story houses of San Pablo, stands out the construction of a new school, as part of the Reconstruction with Change Program. Next to it, a part of the current educational center is still in operation due to delays in the project, which should have been completed by now.

"The school belongs to us, but we have been working on this project since last year, the "Nonitas" [women] were just asking me what happened to the school, I told them that it was to be finished next week, but it is not going to be the case, it is not going to be finished.... It is very nice, this has come as a result of the victims, of the situation that arose [refers to the floods due to El Niño] because I repeat, we had very few students because there were very few families here. We had ten students, fifteen students, now all the classrooms are

over 40 children, now all of them... Unfortunately, the local government did not support us in any way, we had to go to the capital city to make the arrangements. We teachers had to go to Lima in the middle of the pandemic so that the project would not remain! and the project has already come out. But the local government, the regional government, nothing. The mayor of the municipality of Catacaos came to leave us all the victims and never came back.

So, my question was, where am I going to seat these children, what folders am I going to give them, nothing. It is a Christian organization that gave us furniture, we did not even have a place to seat them, we had 20 little chairs per classroom, but there were 40, from where were we going to get the rest! The people were economically poor, what were we going to ask them to bring, even your little bottle of water, nothing, it was not possible. Thanks to God, many good-hearted organizations supported us and now we are waiting for the school to be handed over to us. “

The director, Monica Rumiche, tells us that she is waiting to receive the facilities to be able to move in next year. At the same time, she details the difficulties faced by the area today in terms of health services. The village only has one health center with a nursing technician in charge, there is no qualified doctor and care is only available until one o'clock in the afternoon. During the flood episodes of 2017 she said that a medical tent was established by north Americans volunteers, recommendations were given to the population to avoid Dengue virus infection due to the increase in mosquitoes due to the stagnation of the river.

Regarding the urban situation, it was confirmed that the area does not have sewage facilities, water is limited by sectors to have access three days a week, and there is only electricity. According to the testimony of director Rumiche, prior to the flood the area had 100 families, however, migration has resulted in an exponential growth in the population to 5000 families today. This demographic rise translates into facilities and services with insufficient capacity, like for example the water pump. Five years later there is no response from the local authorities in regard of the water issue and it's access is still restricted.

About the 2017 flooding, Monica Rumiche and teachers in charge tell how hundreds of families arrived from the areas of Catacaos and Pedregal to San Pablo because they are in a high area. The overflow of the river reached the banks of the town, cutting off access to the village for three days, a period during which they received no help from any institution and had to deal with the flood with their own resources. Once the access was enabled, they coordinated with the authorities for the transportation of water in tankers and the distribution of food and tents that stayed in the school for three months.

"We have always been here, but there was a radical change after the river came out, after the El Niño phenomenon, the river overflowed overnight, we were twenty families and from one day to the next we were more than a thousand. In this area we sheltered the affected children from Catacaos and Pedregal. The tents were here in the school for approximately three months.

We had to hurry the situation a little bit because the school period had started and we couldn't start because we had tents and we couldn't say "go away already". We had to play a little bit strong. There were approximately one thousand families here at the school. All the classrooms became houses and the whole platform became tents, tents, tents, tents. That was a very sad situation, we had to find ways with the authorities to bring water in a cistern, to bring water from another place. Even in the town at this moment we have serious difficulties with the water service. Even now we are here, if you look at the conditions we are in, no school in the city would work in these pandemic conditions. That is why I am very grateful to my teaching staff because no teacher in Piura city would accept to work in these conditions, we do not have the basics, we do not have water...

...When the river came out, I was on this side here. I was here in San Pablo and my brothers and sisters told me, "Get out of there because the river is coming out and you won't be able to return to Piura". My brother is a journalist and he called me "Girl, get out of there because the river is going to leave you on that side and from there you won't be able to get through" So my immediate reaction was "I'm not leaving" I told him

"I'm going to stay here in San Pablo" "Hey, get out because the bridges are going to fall down" and I thought it was an exaggeration, I thought this is exaggerated, but then I said: No, this is a high area, the river doesn't reach here. And then we began to see that people were coming here, they were going out [referring to the places near the river], they were going out, and then my people called me and said to me: teacher, you see what is happening? I said yes, he tells me it is serious, the river is coming out, because he had called me, he said the river is coming out and the sadness began. When they told us that the river was coming out in Catacaos we were already listening to the news, here the people started to cry and we started to tell them that the water was not going to come here, I told them it was not going to come here, but we got scared because at midday the water was already at the edge of the town and we thought the water was going to come in. We started to go through the radio stations, to tell everyone to take out their things, the people from the part of the Canaleta, the people were crying, everyone was crying. Are we going to be flooded? and now we were saying, where are we going to go? This is supposed to be the highest part. Then the Civil Defense came and told us: no, here now we are going to put dikes, we are going to put everything in place so you start to shelter and we started. And for me it was a little hard, because I was here with my daughter, and my daughter belongs to the firefighters in Piura, my daughter started rescuing all the children, all the babies. My daughter started and then I was shocked, in some moments I felt like crying, but I could not cry because people were looking at me and my daughter started "No Mom no, the babies, the babies, take the babies out. They brought the babies in tubs, she was in charge of receiving babies, babies, babies and she was putting them in my classroom, which was supposed to be the direction, there. And when we realized that by six o'clock in the afternoon it looked like a daycare center, all babies, so now we were saying how do we change them. We started to call Piura, but they could not bring us support because there was no pass".

In the school they took in all the babies from the area despite of not having the resources to take care of them either: *"So, I would call my brother, please get diapers because they need diapers. We started here; people were very supportive. We passed notices*

through the radio station, that we needed food to make common pots, we spent three days like that. From then on, the institutions began to come and bring aid, to bring breakfast, lunch, everything. The third day, I went home, I finally left, until then everything was fine.”

Talking about the people that had migrated to the area Monica added:

“Some, some of them, at the first moment it was very sad because they were in tents and in tents you cannot survive, now some have already made their own little houses of plywood, of reed that is here and some were benefited with government modules, they have their module, small but they already have their module that was provided by the government, but unfortunately the government could not attend all of them...”

According to the people of the area, the authorities left the victims in the area and abandoned them completely after a month. Today, most of them live in improvised houses made of materials that do not provide real protection against the desert climate of the area.

“These gentlemen who came to leave us the victims, which expected they were going to be given their things quickly, that it would last a month, then they abandoned them and left them. They left them. They left the poor people to their fate. “

Monica Rumiche in her testimony looks back at the events, despite everything, with a comical note, she remembers her own trip to the hospital due to dengue infection and tells us how she sees the babies that she helped to shelter now attend her school:

“Regarding the babies, in the end each one returned to their families, each one is already with their families, they have received help, but the help was minimal, minimal. Imagine, we are talking about 2017, some babies are in kindergarten now! they are already in kindergarten because my daughter looks at their picture and tells them: look, this is you when you arrived in San Pablo. My daughter has these photos and shows them when she comes here on Sundays, because we evangelize here on Sundays, and there she finds them: Look! this is you when you arrived at San Pablo, you arrived in a bathtub!”



Original School in San Pablo village, director Monica
Rumiche, 2022 | Lucia Gherzi



New school from the Program Reconstruction with Changes in
San Pablo village, 2022 | Lucia Gherzi



Water tank in original School in San Pablo
village, 2022 | Lucia Gherzi



Highway, San Pablo village, 2022 | Lucia Gherzi

Flood-prone zone

Once you enter the flood-prone area is easy to imagine the catastrophe's extension from 2017. Visits were conducted to the specific hamlets of Chato Chico and Chato Grande to observe their living conditions after the catastrophe. The few people in the area seem to inhabit a ghost town, surrounded by ruins. The access is made through the main road that connects the villages to the city and it's the only one paved, secondary street are sandy trails that connect the few houses still inhabited and the remains of the passed ones. Moreover, the dispersion of the residences sometimes doesn't allow to appreciate a clear disposition of the lots once one moves away from the main avenue.

From the ruins and the dwellings that have been rehabilitated or reconstructed we observe that those located directly towards the main avenue are or were mostly of masonry. On the contrary, houses visible further into the terrain tend to be made of plywood, reed and calamine, similar to those found also in the new human settlements among the refugees. The materiality difference allows to clearly perceive which families returned to the area after the catastrophe. Among the ruins we perceive brick homes that have been partially destroyed and buried by the force of the water and sediments brought by the flood. The height of the lintels of the doors and windows makes us calculate the height of the soil that accumulated unevenly forming a new floor.

Walking through Chato Grande, some newly built government modules come to sight, one of the owners tells us that the construction of the modules was not a common measure: *"For example, my sister's house was demolished [by the state], they haven't built her a module, they only built one here, some of them didn't and some of them did. Because the state says, I don't longer know how many modules, and when we come to the countryside just one"*, shared the resident. In his testimony he also said his house dated only from 3 months ago, which casts light on the government's time-frame of execution capacity. The dwelling next to the canal from the man interviewed, is a clear example of investment made in vulnerable areas without addressing mitigation measures to protect the new investments from further disasters in the future.

"Right now what we want is for the river to be reinforced, what is the defense, because practically here a phenomenon like the one in 2000 with intense rainfall comes out and passes through here again, the module is washed away and again, there is nothing..." says the resident. At the same time, we observe that the people who live here are fully aware of their situation of vulnerability since decades before: *"The river goes out there, it goes out here, this way, this way"*, he says, pointing in all directions.

"In 1998 he took us out in a helicopter [referring to President Fujimori during his government], he took us to the Panamericana [the highway where the new human settlements are located], but there are people who came back here again, because they came back for the animals, the farm that is close by, they came back here. And the moment that the phenomenon of El Niño came back, they went back there [referring to the Panamericana highway], but they didn't get them out again, only the army took us out with cars." He added explaining the internal displacements between the two areas.⁶⁴

Furthermore, the livelihood of people from this area is based in the agriculture in small and medium size crop lands and the raising of animals. During El Niño phenomenon the testimony told us that their production was lost with the flood and no help from the government was received to level the land afterwards. The river path, that sometimes is directly next to the houses, presents now desertic vegetations such as bushes and incipient trees, dead vegetation, trash, residues and fallen light poles aside.

During the site visit, no mitigation work related to the numerous prevention plans made by the government can be perceived. With the exception of education facilities recently built, a complete abandonment of the area is reflected in the state of the houses, sidewalks, roads, sports fields, parks and squares that remain bur-

64 The reason for this permanent movements were also tackled by the local engineer, Hernán Velazques during his interview: *"It is the only thing they have. They are in a desert, so they return to their area because it has the conditions for them to take their bread home, those lands can be cultivated, those are their lands, they are not going to lose them and it has always been like that. It is not only this phenomenon, it has been like this in the 97 and the 83, there have been other occasions in which they were also flooded, not in the magnitude of this last Niño, but people leave and then return again..."*

ied under the mud. At the same time, there are no health facilities in the area other than the ruins of an abandoned medical center. In this regard, the villager told us that, in order to receive health care, they have to travel to the next town, Pozo Los Ramos. Regarding the health services after the floods of 2017 and then the COVID pandemic, he shared:

“During the emergency, at that time in 2017, all the people got sick with dengue, because there were many mosquitoes and then we also always traveled a good distance to Cura Mori. In Cura Mori, when there was attention, the nurses were only attending at 3-4 o'clock in the afternoon and then they were already leaving. When Piura was in a state of emergency at that time, we had to pay for transportation to take us to Piura to be attended by a private person, and the state was not there to support us in this. For example, back in 1998, that post was there [refers to an abandoned one-story building in Chato Grande] and it never worked again.”

Concerning the relationship between peripheric flooded areas and the city, the interviews conducted also serve to show the lack of policies outside urban areas, where people outside the city have to find methods to access basic services even during emergency crisis.

In terms of service networks, the flooded areas count with water but not electricity or waste. The lack of lightning leads to insecurity and the loss of animals. The main avenue that connects the village to the city and surrounding towns is only fixed superficially: *“The mayor of Cura Mori, the regional government, is the one who is lining his own pockets, but in the meantime, they have not rebuilt the track, just patched it up.”*

Entering the house of the interviewed, a family man of around 35 years, he presents his house by indicating the rooms and where the level of water was at during the floods. In the back part of his plot, where the house activities were conducted before the module was finished (3 months before) he explains that he doesn't want to invest in remaking the walls as they were before with brick and earth due to the vulnerability of the house in face of another phenomenon. This scenario draws a parallel with the government's lack of investment but in an urban scale, where both are conscient of the risk of another flood and therefore don't want to risk capital in re-building properly.

The feeling of frustration, social unrest and lack of trust in the authorities is also present in this area: *“And now the mayors and the candidates practically want to grab the Zion, they promise one thing but sometimes some don't deliver...”*



Bedroom in the hamlet of Chato Grande, 2022 | Lucia Gherzi



Courtyard of a house in the hamlet of Chato Grande, 2022 | Lucia Gherzi



Kitchen in a government's module in Chato Grande, 2022 | Lucia Gherzi



Family farming in the hamlet of Chato Grande, 2022 | Lucia Gherzi



Old brick house in the hamlet of Chato Chico, 2022 | Lucia Gherzi



House ruins in the hamlet of Chato Chico, 2022 | Lucia Gherzi



Abandoned medical post in the hamlet of
Chato Grande, 2022 | Lucia Gherzi



Ruins of a house foundations in the hamlet of
Chato Grande, 2022 | Lucia Gherzi

Established village

As a possible outcome for current new settlements in Kilometer 980, we find the towns near the Panamericana highway that were developed during previous El Niño phenomenon. One young village product of the floods from 1982, called Ciudad de Noe serves to picture this development.

Arriving to the village we perceive that houses on brick and earth are more frequent than in previous cases. Some modules according to the government's models are seen and a neighbour accepts to share with us some insight. When asked about their previous land, a local man of around 27 years told us that since 2002 they left their land near the fields. With social housing programs, housing modules were built, some free of charge and others by agreement with companies or paid for installments. *"There are people there who have their land for farming, for sowing, they have stayed, but most of them have already come here and because of their farms they go back there"*.

Concerning public facilities we observe a school, a sport field and public spaces in good condition such as a square with vegetation and benches used by local people. Mobility is usually done by motorcycle cab, motorcycles and cars. However, public transportation is still far to access due to the lack of lines and the distance from the highway. Despite of still maintaining earth trails with no paved access one can find network services for electricity, water and waste. The modules observed count with all the services and have an area of around 35-36m², covering only a part of the land plot towards the road. In the back of the houses, people extend their homes with materials such as brick, drywall, plywood panels and calamine, enlarging the built space of the module that starts to resemble the urban lifestyle in the capital for its limitation in terms of space.⁶⁵

By comparing current settlements from 2017 with the one of 2000, we observe important changes in this 17 years gap such as basic

65 As it happens in the capital, social housing projects in general are projected with minimal areas and restricted common spaces. The lack of development of proper and dignifying social housing, destined to the "mass" and the people in need, raises questions about architects and society's priorities and values.

service networks; development of social housing projects that allowed local people to access a house module; progressive change in the materiality of constructions, which relate to their permanent character and involves a psychological feeling of certainty and safety; and public spaces for reunion and sport activities.

On the other side, accessibility is not solved due to its lack of public transport and difficulties to enter the settlement without a private transport; the quality of the streets and sidewalks diminishes or disappears as one moves away from the public facilities such as the school, the plaza and the sports fields, where the materiality of the houses remains poor. The feeling of abandonment of the previous scenarios is almost lost in the center of the village where people transit. Therefore, one might assume that dwellings in poorer conditions and distanced from the public investments belong to people that migrate constantly between their crop lands by the river and the safe zone during El Niño phenomenon.



Street and housing modules in the settlement of
Ciudad de Noe, 2022 | Lucia Ghersi



Extension of a housing module in the settlement of
Ciudad de Noe, 2022 | Lucia Ghersi



Square in the settlement of Ciudad de Noe, 2022 | Lucia Gherzi



Sports field in the settlement of Ciudad de Noe, 2022 | Lucia Gheresi



School in the settlement of Ciudad de Noe, 2022 | Lucia Gheresi

A helping story

A feeling of unity crosses repetitively the testimonies from people in the city of Piura when sharing experiences of mutual help during the floods of 2017. The story of the engineer Hernan Velazques allows to picture the social networks set on place during the catastrophe as well as its severe repercussions.

“This lasts Niño (FEN) happened in the early hours of Sunday morning. On Sunday I started the evacuation at 10 or 11 o'clock in the morning and we began to transport people from Curamori to the 980 Km or so. Now it is full of houses, but when I went and arrived, we took a long time because we were carrying elderly, invalids and we didn't allow them to carry many things. People wanted to carry their animals, little things and I told them that there was no room for their things, but they cried, but since we were just 3 cars, we could not do anything else. When we were already on the second trip, the army wagons arrived to take the rest of the people.

When we arrived at the designated area there was nothing, it was a completely dark, sandy area, the tents arrived later, after 3 days and they were in that sandy area for 3 days.

I had repellent in my car because I always carry it, I had my sweater, bottles of water and a flashlight. I had to leave them all, the mosquitoes carry me in weight, people wanted to give you a chicken or a watermelon, I told them “No, you don't have anything, no” I said because it was depressing to see where we were leaving them. Imagine arriving in the desert at night, you find only dunes. The COER had designated that area to evacuate them, or I did not know where, I did not know the area.

There were some small towns over there that had been formed after the previous FENs.

I got to a certain area because it was all sand and the car could stay there. We made 3 trips transporting people with the minimum. The next day we started helping to continue evacuating people, we took the cars as far as we could go and took water, food and medicine, then I started to post on social media. My class has studied here in a school, I have a relative

who is a general of the FAP (Peruvian Air force) he was put in charge of logistics and we are well united, as with other friends that after seeing what I had posted my class began to collect things that were delivered to my relative of the FAP and I picked them up and took them to the assigned area.

My wife works at SUNAT and many also helped, my family included, for 15 days we were assisting. At the beginning we prepared breakfast, eggs, sandwiches with butter, ham, coffee, water, we bought bananas, whatever we could, whatever they received, whatever we could. There were people who came to help us. I had a truck in addition to the van and we were taking them. By the third day we were not preparing the breakfasts anymore, we were taking them just the food and many people began to help. I supported more or less for 15 days, the areas were flooded and we had to go further inside, because there were people who had stayed in the hills or on top of their houses.

As we began to publish on Facebook, here in Piura there is a fishing cove that is near Paita, they have rafts made of sticks, which here is something traditional; 3-4 sticks joined together and that's how they make a raft. They called us: Hey Hernán we can go and help you with the rafts. I had not thought of that, they came with their rafts, with their money and their cars, they were here for about a week. I told them: Look, I assist you logistically, I take you breakfast, water and that's what we did. They brought people to the dry area, they brought people all day long, because you could not do it by motor because below the water there were sticks, houses, animals, things, I never found a dead body because I did not get in there. I was the logistics, I moved to Piura, to the airport, I brought them here and there, but they did see dead bodies floating, dead animals, cows, ducks, goats, chickens, everything. It was difficult because you didn't know where you were stepping; then in the rafts they took people out until around 3 o'clock in the afternoon, they arrived and we gave them their food but they were net fishermen, and they got in again and went far away to rescue people.

From there other people came in. I had a French friend who had an inflatable boat, he also came with his truck and sup-

ported me with everything, as did all my family and friends.

There was a man who gave me bananas that he could not export because the roads were cut and we picked them up with the truck and he told us to load everything we could for the people. My workers went free of charge with the truck to load the bananas, and the first day the truck was stuck in the mud. Two days to get the truck out, full of bananas, and the man from the farm gave them food, filled the truck with fuel, until they got the truck out. We made two trips, we asked for army cars to go to load but I did not get their help, I did not reach the government and many other people began to help with food, water, food repellent, etc.... There was a lot of help, people reacted, you could see families, groups that were carrying food...

There was help from the government, what was missing was a leader. That was evident when I asked for help to carry the bananas, I didn't get any help.

CHAPTER 3

III Architecture and the disaster

Architecture and the emergency

Architecture and the emergency are closely related through a reinforcement loop. On one side, the catastrophe feeds itself from the built environment and relates directly to this last one's scale. This can translate in a bigger emergency impact with major material and social losses and the increase in population's vulnerability.

On the other side, architecture is still being constructed in an insensible way towards natural hazards, in vulnerable areas or serving itself only from large-scale engineer structures in an illusion of control over nature.⁶⁶ The bigger the emergency usually means the bigger the response; the bigger its efforts to go back to normal, the bigger the display as a mean to relieve what itself inflicted. At the same time, emergency architecture, related to temporary shelters supposes already an impact on the environment that should not be neglected. The setting of hundreds of plastic tents and the installation of numerous shelters that go to waste or “vanish” because of harsh natural conditions means an important use of resources and energy that contribute to worsening climate change, which sometimes is the first cause of the emergency. This is why, architecture and disaster planning can no longer neglect the environment where they are inscribed, nor their impact and responsibility towards it, which also applies in emergency circumstances.

Being partially responsible in the destruction of not only houses but also homes, which relate to the emotional and psychological spectrum of the human being, architecture should be developed in a resilient and responsible way towards possible vulnerabilities and risks. The disappearance of the basic need of security, the uncertainty of the victim's basic needs for subsistence, the separation of large families and the setback in their development are all consequences related to emergency conditions that also need to be prioritized when performing emergency displays.

66 [12] J.L. Nancy, “After Fukushima: The Equivalence of Catastrophes”

Emergency-architecture responds to this context and is defined as the humanitarian aid related to shelters, transitional housing and health facilities to avoid further vulnerabilities after a disaster/conflict has happened. Therefore, according to the Sphere Handbook of 2018, it is involved at different levels in multiple areas such as the water supply and sanitation promotion, food and nutrition, settlement and shelter; and health services.

Sanitation

In order to avoid diseases particularly infectious ones, as we have seen in the case study of Piura with the dengue infection, emergency architecture is involved in facilitating safe and affordable water supply for personal and domestic use: private, safe and clean sanitation facilities; and water storage. Regarding the water supply, one of the main concerns from people on site, this is given by water tankers to common and individual tanks that are often hidden inside people's homes to prevent theft. The distance between all houses and the water points should not be more than 500 meters according to international guidelines. [26]

Food and nutrition

Related to food and nutrition, architecture can give access to cooking facilities, food storage and distribution, promoting a good nutritional status that reflects in a better performance in pursuing livelihood opportunities in adults and education in children. For the study case, the users are people that lost their crops to the floods and have the habit of producing food for personal consumption and sell. Thus, architecture response should serve itself from the expertise of the affected population to empower them and make them a motor of development. Their current knowledge and abilities in terms of agriculture and construction should be taken into account and guided to make them independent through innovative construction practices.

Among the means to achieve this, it could be considered: providing spaces of production by introducing improved crop varieties, livestock or fish-stock species, new tools, involvement in the construction of shelters, rehabilitation or reconstruction programs, etc. Feelings linked to catastrophic events like fear, insecurity, trauma and frustration can be sometimes be relieved by a sense of purpose and involvement.

Housing

Concerning housing, emergency architecture englobes multiple fields and should be perceived as a component in a settlement instead of an isolated object. This way, topics external to the module can be addressed, such as: community life, security, accessibility to a broader network, livelihoods and basic services. Beyond the construction of new human settlement, people touched by a crisis are in a delicate situation and state of mind. Therefore, architecture should also promote a sense of safety, community and social cohesion. Settlement's location is a crucial factor to take into account, the accessibility to livelihoods and other work opportunities relate to the connectivity of the settlement can affect where the people choose to live.

Connectivity and accessibility difficulties were seen constantly during the site visit in the case study area. Between their most direct repercussions where the lack of access to basic services for health and education, lack of transportation option that leads to a distancing in family relationships and makes the work hunt harder. The lack of land available for agriculture and grazing translates also in the migration of the affected people back to flooded prone areas, preferring zones of risk over isolated settlements.

Furthermore, regarding the living space, guidelines like the Sphere Manual of 2018 suggests a minimum of 3.5m² of living space per person, without considering services such as the kitchen and toilets. However, this area should vary depending on the climate, suggesting between 4.5m² and 5.5m² for cold climates or urban settings where the cooking and bathing spaces are included. The height of the ceiling is established at 2.60m in hot climates. Taking into account that temporary settlements tend to last longer than programmed, the Handbook also suggests 45m² per person in camp-type settlements including private spaces, communal services to do outdoor activities.⁶⁷ Currently on site, shelter conditions don't match the international standards, nor the priorities of the victims and therefore should be constantly improved.

67 [26] Sphere Project, "The sphere handbook: humanitarian charter and minimum standards in humanitarian response"

Health

Finally, emergency architecture is also strongly involved in providing health facilities that are critical in the initial stage of the crisis. Health modules should be kept during all the response stages to promote healthy practices, prevention, treatment, rehabilitation, palliative care; as well as psychological counselling in spaces that allow privacy and comfort. [26] As corroborated on site, people displaced and in flood zones are currently without access to medical care and attention is very limited.

All these practices, weather related to architecture directly or not, should be ideally involving the capacities of the affected community and go according to national integral plans and parallel to an urban planning. As we saw in people's stories, chains of help are present among neighbours, volunteers, educators, professionals, and more, so an even stronger community engagement should be further promoted to take advantage of the existing social networks in relation to the capacity of municipalities, local and regional governments.

Emergency architecture, the first phase of post-disaster architecture is normally the one that receives more attention, social support and financing, therefore, it has also the opportunity to set the basis for next phases in order to save time, materials, energy and resources. Although it will never be a smooth path, emergency response can establish good baselines for a more comfortable way towards recovery and reintegration.



Temporary plastic tent in the settlement of
Jesús de Nazaret, 2022 | Lucia Gherzi



Common water tank in the settlement of Jesús
de Nazaret, 2022 | Lucia Gherzi

Post-disaster architecture

Should we assume temporary shelters always as permanent? Is the limit between temporary shelters and definitive housing clear?

Post-disaster architecture in this text is the one produced after a catastrophe took place, it addresses multiple interventions in coordination with different institutions and involves different phases: temporary shelters, transitional shelters and permanent constructions through rehabilitation of existing dwellings or full reconstruction. The disaster's impact on housing sets this basic asset at the top of the victim's necessities after a disaster. For this reason, these three different lines of work happen simultaneously depending on the degree of damage on the infrastructure, its location and the population needs, considering whether the affected buildings are in a safe or risk zone.⁶⁸

The right to access adequate housing to live in peace, security and dignity is a right that has to be preserved even during crisis conditions. Therefore, shelters should also be: “*affordable, allowing the household to attain other essential goods and services to live in dignity; habitable, providing physical safety, protected and adequate living space, access to safe drinking water, adequate water, sanitation and hygiene (WASH) facilities, and food preparation and storage; culturally acceptable; accessible and usable, including for persons facing mobility barriers; and located to provide access to livelihoods opportunities and essential community services.*” [26, p. 244]

As expected, the most generalized and distributed shelters in reality don't meet the suggestions given by Sphere but respond mostly to fast solutions. Shelters, when designed poorly, make the displaced people vulnerable for a second time by staying in undignified conditions for periods of time that are known to be longer than they should. Furthermore, with or without having faced an emergency crisis, frequently in peripheric areas where new human settlements (formal or informal) are developed, these criteria for an adequate housing are not fully achieved either.

68 Course of “Habitat et Développement Urbain” by professors Nadia Carlevaro and Yves Pedrazzini on 2022. Concepts are also taken from the slides presented during the course.

Temporary Shelter

Temporary shelter after a disaster begins with **emergency shelters**: these are the most basic and fast shelter solution, reason why, is used for short periods of time to give life-saving support for a single night to a few days during an emergency. This type of measure doesn't allow extensive preparation of food or prolonged medical services, which helps to define them as a short-term solution. Normally associated to plastic sheeting and tents, these get installed in pre-established sites according to disaster management plans or in public buildings. [38]⁶⁹

Plastic sheeting and tents tend to be the image of emergency responses due to their lightweight design, which translates into an easy storage, transport and a fast distribution after the disaster impact. Their efficiency is crucial when considering the possibility of rupture in the supply-chains after the impact. Also, their simplicity allows them to be "flexible" and produced at a large scale. [39] For authorities and international organization who face hundreds of displaced people, these types of shelters provide a fast-response to give security but also visibility for funding and humanitarian aid.⁷⁰ In the case of temporary **tents**, these are flexible in the sense of being free spaces to receive different uses and people. However, this flexibility is neutralized once they are distributed equally among family's despite of their size without capacity of adaptation.

In the case of more resistant **plastic sheeting, tarpaulins**, they can come as a kit with several tools and fixings like the IFRC shelter kit. [40] In these cases, flexibility also relies on the use of this tools and tarps for several different purposes, not just for constructing emergency shelters but also: to repair damaged houses, upgrade existing shelters, help build new structures such as latrines, fences, water collection points, removing rubble, digging drainage or supporting livelihood activities to build furniture, gardens or boats. Nevertheless, this option doesn't include materials for the frame, which pushes their use in addition to materials on site and local

69 [38] A. Bashawri; S. Garrity; K. Moodley, "An overview of the design of disaster relief shelters"

70 [27] A. Chalinder "Temporary Human Settlement Planning for Displaced Populations in Emergencies"

construction methods. However, this can also translate into a collection of wood coming from surrounding natural forests in order to build the skeletons. In the case of Piura, the dry forest gives crucial protection against further environmental disasters and is a fragile ecosystem where it's illegal to promote its use. For this reason, this type of shelters is not advisable for their use in camps or new settlements but specially for not displaced people. In case of their use as shelter, sustainable sources to support the plastic have to be taken into account.

Temporary shelters, beyond financial reasons, are displayed due to lack of time for better and more lasting solution that involve further assessments after the disaster happened. Still, plastic tens and sheets present inconsistencies with the climate conditions and make victims vulnerable to experience cold and hot given the materiality of the tents. Also, factors like strong winds can suppose a risk for these shelters and therefore should be considered.⁷¹ These types of temporary shelters can have good qualities in terms of response efficiency but their same advantages make them the perfect example of a shelter that ignores their environment. Also, despite of being a clear temporary measure, emergency shelters tend to be used for longer than expected, as was seen in the case study, becoming the living space of victims for several months or years.

Among other temporary measures we find other **kits of materials**. As we saw in the interviews conducted to the COER center, kits of materials in this case are found in fewer numbers than the victims and contain the same materials that people buy for themselves later, in case of not getting help or in normal conditions for their low prizes. These materials (plywood/chipwood panels and calamine) provide a better protection against the desertic climate in comparison with plastic tents but are still very poorly. Kits of materials need to be easily assembled and disassembled to move them in case of need with tools that don't require electricity.⁷² This shelter kit, should be adaptable to variations related to seasons and be cultural, social and family appropriate. If local materials and people's capacities are included, this system can promote a

71 [39] UNHCR, "Emergency shelter standard – UNHCR | Emergency Handbook"

72 [40] IFRC, International Federation of Red Cross and Red Crescent Societies, "The IFRC Shelter kit"

direct involvement of the population through training programs to become familiar with the materials, innovative and adequate constructive techniques and a retake of control.⁷³

Furthermore, **Prefabricated modules** can be transported as a set or as a kit to be assembled on site. In the case study, we saw prefabricated modules for housing, as well as for educational classrooms and health services. As we can see in government's standards for temporary housing modules, these aim to cover different climate conditions by adaptations in the form and materials.⁷⁴ However, confronted with reality, these prefabricated modules tend to be designed for architects and engineers from the capital with no deep knowledge of the site conditions and without taking into account the necessities of the victims they are working "for". Instead, these prefabricated modules tend to become a fix-recipe that doesn't respect either the environmental conditions and climate of the region they are installed, nor the users. Among further inconveniences for this type of housing is their high unit cost, the difficulties in their shipping, the production time, the assembly and disassembly challenges regarding organization and good-practices to re-use the pieces/elements in further circumstances and locations.

Temporary shelters are meant to have short-life spans and therefore, according to the IFRC, the speed and cost invested in these should be limited. However, this consideration is questionable when seeing that temporary shelters tend to become temporary housing (which is thought to last from six months to three years).⁷⁵ The difference between shelter and housing is "*...the resumption of household activities and responsibility (Quarantelli, 1982, 1995). With temporary housing, routine day-to-day household activities are re-established, and those in temporary housing wait for permanent housing, either returning to their pre-disaster homes or*

73 This could be done by setting up a group or brigades for the construction of this type of infrastructure, ideally people with some work experience, including young people to ensure continuity over time.

74 An example of the government's standards regarding temporary housing modules can be found in the following source: [46]

75 [38] A. Bashawri; S. Garrity; K. Moodley, "An Overview of the Design of Disaster Relief Shelters"

some type of alternative housing solution.” [41, p. 5]⁷⁶

After briefly analysing temporary measures and contrasting these with the testimonies, it is perceived that not all temporary shelters can be assumed as permanent and that their temporary character is strongly related to being installed in temporary sites rather than their design qualities in terms of materials, social practices and environmental considerations. This is why, organizations like IFRC also emphasises that other types of options should be previously consider or integrated. Among these alternatives, there is training programmes; financial help as vouchers or loans, financial compensation to move out; or the distribution of long-lasting construction materials for self-construction with assistance, always in consideration with the needs and vulnerabilities of the affected population.⁷⁷

Among the disadvantages of temporary standardized shelters, we find their high cost in environmental waste. Ironically supposed to relieve the vulnerability state, they end up reinforcing it by becoming a source of contamination with a planned obsolescence, cause of the catastrophe itself. This transgression to nature can also become a reason for governments to localize camps and shelters in far and disconnected sites in order to preserve better locations for permanent projects. [27] Other deficiencies in temporary shelters relate to lack of privacy, their inflexibility in terms of adaptations to different family sizes or their inconsistency towards the environment and climate conditions where they are installed.

These same weaknesses are the ones that create the necessity of further shelter solutions in order to give more dignified living conditions to displaced population for longer periods of time while definitive measures can take place. It is argued that better temporary shelters could avoid the transitional phase and economize time, costs and materials at the same time. On the other hand, the same disadvantages of temporary shelters can become a valid reason for governments to adopt these over more resisting and adequate solutions.

76 [41] W. Gillis; N. Dash; Y. Zhang; S. Van Zandt, “Post-Disaster Sheltering, Temporary Housing and Permanent Housing Recovery”

77 [40] IFRC, International Federation of Red Cross and Red Crescent Societies, “The IFRC Shelter kit”

Taking the specific Peruvian context, it has to be acknowledged that the government has not the capacity of constant surveillance to control and prevent informal settlements. Therefore, the settling of people in un-sanitized or at-risk areas (which can be the cause of their victim status) or in natural protected parks has become a constant practice. This informality can lead the government to use short-term shelters to difficult informal settlement as a strategic move. At the same time, government's have the responsibility to care over their displaced populations and to give them the conditions to develop and recover.

Transitional Shelter

Transitional shelter is an intermediate phase between temporary shelter and permanent housing that can last from months to several years. "*Transitional shelters are commonly relocated from a temporary site to a permanent location, upgraded into part of a permanent house, resold to generate income to aid with recovery, recycled for reconstruction, and reused for other purposes.*" [38, p. 926] According to this definition, this type of shelter is conceived not as a complete object built at once but to a process where it's built incrementally with distributed materials by the people themselves. This resourcefulness and self-management should be supported by authorities and organizations involved to address transitional shelters as a progressive tool instead of a straightforward expensive shelter solution. [42]⁷⁸ By doing so, also the limits between temporary and permanent measures becomes fuzzy and a more regular process of housing development is shown. As it happens with a regular house in ordinary situations, the transitional housing would suffer modifications, renovations, demolishing, reconstruction or extensions to meet the changing needs and wishes of the inhabitants.

Among a crucial factor of transitional housing and the fuzzy limits towards a permanent house is their relocation to a permanent site. This factor strongly promotes a long-term living space independently of the materials they are made of. As was remarked in the case study, kits of materials distributed among the families for emergency shelter are the same materials people got themselves

78 [42] B. Rohwerder, "Transitional shelter in post-disaster contexts"

to build their transitional housing in the visited new human settlements in the Kilometer 980. The crucial difference is that houses built by themselves were less limited in terms of space and more according to their social and cultural practices. This makes us question if collective shelter, as it happened after the disaster, could be the first emergency response, followed by financial help to obtain the necessary materials. This way, if planning could pre-establish permanent locations beforehand, the need for temporary shelters and their impacts could be reduced while supporting on-site shelters. As a result, people would obtain more adequate living spaces according to their own choices while avoiding corruption associated with deficient shelter distribution.

Permanent Housing

When its possible to adopt permanent solutions, these should be prioritized over temporary ones. Among the reasons we find that temporary housing can disrupt community's nature, their social networks and livelihoods. This along with psychological damage can potentially debilitate the recovery process. Furthermore, investing in permanent houses reduces material waste, investments related to displacement, avoids use of resources and energy in temporary measures and allows the victims to resume their responsibilities and lifestyles faster in order to get reintegrated.

At the same time, people's needs and wishes also match permanent solutions related to rehabilitation and reconstruction over temporary shelters. It is seen that victims prioritize returning to their normal daily activities above housing commodities. It is argued that people in temporary shelters make less efforts to turn to their normal routines and temporary shelters are seen as the last resort.⁷⁹

Permanent housing shows less constraints related to time-efficiency measures after a disaster crisis, for this reason, it has the opportunity to respond to the people's needs rather than being constructed as standardized objects. In order to achieve more sustainable solutions, consultation of the community in the decision making for their homes is a good way to build commitment from

79 [41] W. Gillis; N. Dash; Y. Zhang; S. Van Zandt, "Post-Disaster Sheltering, Temporary Housing and Permanent Housing Recovery"

the residents to the community and restore the lost identity of the place. This measure can show benefits not only in rehabilitation projects but also in new reconstruction processes in other areas: *“Residents who have had a say in their housing design are more likely to return permanently and stay in place, which can stabilize neighborhoods and promote home maintenance and upkeep.”* [41, p. 7]

Rehabilitation

After a catastrophe has taken place, roads, highways, houses, public buildings and facilities, basic service networks collapsed and the task of rehabilitation starts automatically. This task can be understood as a punctual action in a single building or in a systemic way involving the region. In the first case, the work related to rehabilitate a structure are mainly addressed and appealing to architects while the context rehabilitation is more related to civil engineer operations. In both cases, to rehabilitate means returning a building or a structure to a useful state. At both scales of rehabilitation, an appropriate practice would be to consider the effects of the disaster in order to implement them as lessons.

Important to clarify is that rehabilitation⁸⁰ doesn't imply achieving a pre-existing condition but turning it functional again by repair, modification, or alteration. [43] To achieve this, the task involves working with the existing and the specific constraints according to individual case analysis that come along. However, principles of action can be repeated for similar infrastructures without forgetting the specificities that the environment can suppose.

80 Among rehabilitation domains, we can find the concepts of: restoration which relates to the aesthetic, historical and cultural values of the building; renovation, which aims to recover, improve or increase its habitability, usability or safety conditions while conserving the building's use; maintenance, that looks to conserve or recover the building's functional capacity to make it safe to be occupied; and retrofitting, that involves a conversion from the current building into a new state and function. [43] Qualharini, E.; Costa, L.; Silva, M., “Rehabilitation of buildings as an alternative to sustainability in Brazilian constructions”

Rehabilitation can be used to adapt the building to new uses and more strict construction and energetic standards, becoming a long-term solution for constructions during their life service. Working with the existing involves the utilisation of resources that are already set in place, this means less disposal waste by avoiding demolishing and rebuilding but rather rethinking what's already on field to maximise their value and potential.⁸¹

Furthermore, upgrading the assets systems can translate in gains of energy and water consumption while achieving higher comfort for the inhabitants and keeping the urban landscape. For this, the practice of rehabilitation should be encouraged when possible. Also, in order to rehabilitate a building, the cultural and local construction techniques have to be studied in order to work and merge with them, acknowledging and returning them their value.

Practice of rehabilitation can be thought for the already existing built environment after a catastrophe as it can be associated with reusing the temporary shelters as a source of materials or to meet other uses through retrofitting. In the case study, modules related to education could also be transformed into residential modules with interior adaptations thanks to their higher quality in terms of materials and protection against the weather, instead of being wrongly disassembled and thrown out:

“When the prefabricated classrooms came, they came and brought everything together. Badly stored, it was still raining, dust came in, you went to assemble a classroom and you were missing a piece, go look for it in the sea of things that were there! Everything was lying around with no shade, everything was broken, the pieces were stolen. They are building schools now, there are prefabricated classrooms. They hired a company to disassemble them so they could build new buildings, but due to corruption issues they hired a random guy and he dismantled everything and threw it just all away.” -Local engineer Hernán Velazques.

Furthermore, we can see rehabilitation processes also in temporary shelter through collective shelters. This means the use of pre-ex-

81 It's important to clarify by this, that resources in place have to be respected and treated in a sustainable way in order to avoid severe environmental impact and create further problems related to further possible catastrophes.

isting buildings and structures where displaced population can be grouped while more permanent solutions can be found. However, building such as schools, hotels, gymnasiums, warehouses, etc. are not deigned for this purpose and therefore must be rehabilitated or upgraded to meet the shelter standards. [44]⁸² Assessing if these buildings will come back to their original function, these existing structures can give advantages in terms of location, economise of materials and resources by not installing temporary and disposable shelters but adapting the existent. However, considerations in terms of security and privacy are crucial for them to meet good living condition standards to reduce the risk of violence and conflict.

As was shared in the testimonies, the first response for some of the displaced victims was in collective shelters where they were gathered and several communal activities took place in order to support each other. This collective response of solidarity contrasts with the distribution of individual temporary shelters. However, this individual character also avoids problems related to exclusion, violence, discrimination, privacy, etc. Depending on the type of disaster and the displaced population, collective shelters could be a proper solution when meeting good shelter standards. This could allow the community to enjoy the benefits of mutual help, cultural and social activities among people that shares the same traumatic experience.

Reconstruction

When the process of rehabilitation is not possible due to the extent of the damage or the location of the structure in unmitigated risk zones, reconstruction is evaluated. Reconstruction can take place in the same plot of land or in a new location, where considerations regarding public services, connectivity, access to livelihoods should be taken into account to favor reintegration. Also, reconstruction can take many forms and scales, from the single-family house, to housing complexes or existent structures for collective shelters. Taking into account the carbon footprint that construction has in general, reconstruction programs after disaster should consider and encourage the use of sustainable and local materials

82 [44] UNHCR, “Collective centre rehabilitation - UNHCR | Emergency Handbook”

from sustainable sources, local constructive techniques, reuse of materials and local labor and construction companies.

Constructive techniques associated with flood prone areas are: the over-elevation of the house (as occurs in the Peruvian jungle near rivers), the reinforcement of windows and doors to avoid the entering of the water, the choose of materials that won't get saturated and destroyed by the contact with the water or construction techniques that allow resilience through fast rehabilitation.⁸³

Furthermore, the knowledge related to the climate, materials and social practices is easier to be understood by local people and contractors. For this reason, programs relating the local capacities and knowledge should be encouraged along with financial support to get the necessary adequate materials. As was previously mentioned, reconstruction can already be contemplated in pre-disaster planning, this way an identification of possible stakeholders can take place in advance in order to give a faster response:

Solutions like the one proposed in the RAPIDO program require extensive preplanning to work, from pre-procurement of materials to pre-permitting of approved plans, and pre-identification of local designers, builders, case managers, and contractors. FEMA has long preferred national vendors, but experiments such as RAPIDO indicate that using pre-determined local or regional vendors may have multiple benefits, including the infusion of local knowledge into the design and choice of materials, as well as long-term commitment to completing the job. A final benefit is the support of local economies. While local labor forces may be inadequate for the whole job, using local contractors will maximize this labor force and return profits to the community itself, which builds capacity and resilience over time. [41, p. 7]⁸⁴

83 Recommendations of this kind can be found in several different sources, as for example the "Empire, design and drafting" web page about "*Tips for Building or Rebuilding in Flood Zones*"

84 [41] W. Gillis; N. Dash; Y. Zhang; S. Van Zandt, "Post-Disaster Sheltering, Temporary Housing and Permanent Housing Recovery"

Shelters, according to international standards such as Sphere (2018) are already conceived as something that can transition into something more permanent, by upgrading it, reusing it, reassembling it or moving it from temporary sites to the definite permanent location. [26]⁸⁵ Meant to respond to the people's long-term needs, permanent housing, whether it's achieved through transitional shelters, rehabilitation or complete reconstruction can favour the re use of components and materials.

A reuse practice is already seen in the current new settlements. According to the testimonies, families would bring the materials they had from their previous homes in flood prone areas in order to help build their new homes. Also, the use of temporary modules is found next to the rest of the transitional shelter as an extension towards a permanent house. Among the reasons to encourage this practice we find: reductions in terms of waste, less use of energy for fabrication and transportation, economic savings for the families, creation of work in maintaining and upgrading shelters and the use of familiar components, tools or materials that go according to their construction culture and knowledge.

Taking into account the government's instability and disarticulation in order to respond to the victim's needs, the increase in risks related to climate change and the disruption of supply chains in order to receive external help, reuse practices could give the community a certain degree of autonomy. By giving them tools and knowledge of how to work with what's already in place, as they tend to do instinctively, affected populations could intervene in their recovery process. However, in the case of floods, reusing materials would be limited to phases after the emergency response, since the presence of water and mud in the first critical stages leave materials unusable.

Moreover, the reutilization of materials or other components can add another layer of fuzziness between temporary and permanent measures. Prefabricated temporary shelters can come back as disassembled elements for permanent housing. On the other sense,

85 [26] Sphere Project, "The sphere handbook: humanitarian charter and minimum standards in humanitarian response"

permanent housing destroyed by the disaster can come back as materials and components used in temporary or transitional shelters if they are recuperated.



Reuse of temporary shelter in the hamlet of Chato Grande, 2022 | Lucia Gheresi

Principles

Are temporary shelters sufficiently equipped to maintain a dignified lifestyle? How much identity can be put into this kind of constructions without taking away their efficiency? Should shelters and constructions be a fixed recipe?

Architecture in general but post-disaster architecture specially should put the user first and be designed with empathy, giving dignity and security to the most vulnerable people. After a disaster, the physical and mental health of a person can be completely disrupted and shelters are the first domestic space where they start to regain control over their lives, future recovery and development. For this, post-disaster architecture should not only limit itself to a low-tech, energy efficient building but understand that victim's reactions and needs will vary and work accordingly. In order to achieve a victim-centered approach, consultation since the decision-making process can help create involvement that translates in a sense of belonging and appropriation. Furthermore, this would allow investments to be made consistently and without wasting efforts.

Keeping in mind the reasons why standardized shelters are the most used and distributed, that relate to speed, costs, transportation and stockade facilities. These factors should be taken into account by post-disaster architecture and translated to the site specificities in terms of social, cultural and economic practices, as well as the local climate and environmental conditions. By involving the people that architecture is meant to serve and their priorities, shelters already stop being a fix recipe and become an adapted response with a higher satisfaction.

Furthermore, a shelter has to be conceived as an element in a system to give the displaced population a more sustainable response, involving the possibility to access their livelihoods and a broader work network to be independent. Is important that shelters are installed in a respectful manner towards the environment for its preservation, which could at the same time, favor their location in a strategic site rather than an isolated one. For this, planning in the phases of mitigation and recovery are essential to achieve integral projects that meet the user's necessities.

Also, sustainability in terms of construction should adopt natural, recycled and local materials (that need to be from a sustainable source, affordable and accessible), while considering possible adaptations of the space for diverse uses and inhabitants. This flexibility along with re-use practices could avoid more external supply chains with risk of disruption during the disaster, less construction waste, contamination and favor self-sufficiency.

Post-disaster architecture is the framework in which communities are rebuilding not only their homes but also their common identity. It is understood that early responses and emergency shelters have to be as efficient and fast as possible and its priority is only to cover the minimum needs, reason why topics such as identity and culture are not a first priority. However, early as possible in further phases of post-disaster architecture the culture of the place in terms of materials, typology, uses, daily habits, family sizes and livelihoods should be respected. For many displaced victims, the community is the first support system they have. This social infrastructure is also affected by the disaster and should be addressed by post-emergency architecture through spaces to meet and interact. The recreation of bonds and social connections among neighbors and survivals can help them to overcome the crisis as a community in their recovery. [3]

Temporary shelters have a global tendency to last longer than expected and, despite international guidelines in order to give safety, dignity and a decent lifestyle, they normally don't provide it and fail in recognizing *"that the severe limitations many households face when addressing housing issues in normal situations can result in a failure to transition out of temporary housing into permanent housing is a message relevant in nearly all post disaster situations globally."* [41, p. 8] This way, the limited "comfort" given in shelters that are meant to be temporary, become the everyday live of the people that still inhabit them many years after in not-sanitized and undeveloped conditions.

Without being naïve, post-disaster architecture can't solve the complex conditions of each context and population with one building but can promote and introduce good practices to improve the shelter and housing standards, while teaching new tools to strengthen the capacities of the community to be an active actor to work with.



New settlement of Jesús de Nazaret, 2022 | Lucia Gherzi

Conclusions

This “Énoncé Théorique” is taken as a work in progress to help order, develop and discuss personal ideas and convictions of the role that post-disaster architecture and architects plays after a catastrophe. Therefore, this conclusion serves more as an introduction of clues to pursue with the following master project.

Regarding the global context, it's observed that globalised profit-based systems can translate into an aggressive urbanisation that in developing countries such as Peru mean: uncontrolled urban sprawl, poor sanitation and housing conditions, increasing levels of inequality and social segregation. This phenomenon is even more tangible in peripheric and rural areas due to the centralization of economical, institutional and political power in the capital.

Centralization, a territorialized power, plays an omnipresent role with several and deep repercussions. The case study, which serves as a lens for analyzing more generalized problems shows for example: a lack of capacity in terms of management, corruption, restricted financial power and capacity from regional and local governments, therefore a lack of urban services and maintenance. Moreover, self-management practices adopted by the population due to the generalized abandonment and their staying in informal settlements and poor housing and living conditions that increase their levels of vulnerability to natural disasters. Furthermore, centralization also relates to a constant dependence of the central government in terms of disaster management measures in all the phases and a lack of knowledge and negligence of the social infrastructure already in place as well as the populations culture, needs, lifestyle and priorities.

For the phase of mitigation, projects of mitigation that are supposed to be implemented locally need the central government support (as it happens still with the program of Reconstruction with Changes which translates in a slower and inefficient implementation. Considering that the majority of dwellings after the floods from 2017, at a national scale, are in their definitive plot land and needing for reconstruction, the need for mitigation measures is vital to avoid them more casualties in face of future hazards.

In the case of preparedness and emergency phases it's observed that the emergency is treated locally, regionally or nationally according to its severity. In the case of floods related to El Niño phenomenon a critical degree is usually reached and local governments tend to need all levels of institutions to intervene. In terms of support this means for the victims a lack of sufficient emergency shelters on site for a faster relieve, not enough food and basic supplies, emergency warehouses with no access to populations isolated due to the interruption of roads and highways by water. For these reasons, emergency responses come also from the same victims that have to cope with the catastrophe with their own means and resources. Emergency responses from the government as well as international help don't support the chain of help already in place between local people but instead provide insufficient or inefficient temporary shelters that are known to be more long-lasting than previewed. Also, the shelters provided don't respond to the climate conditions, nor the family's composition and difficult their access to their livelihoods due to their isolated location, making the victims dependent on external help and condemning them to poor living conditions.

In terms of recovery, it can be perceived that a city vision is also imposed by the power structure and results in fixed "ready to be inhabit" projects that are rejected by the victims for being inconsistent with their needs. Through housing projects such as "Vive Castilla", we recognize problems related to the plot and housing area, highly reduced in relation to the family's size and their activities such as animal raisins and familiar crops; lack of mobility, no public transport lines, reduced and expensive options to move in and out the housing complexes such as taxis or private cars; lack of accessibility to their agricultural lands and other livelihoods, difficulty to connect to a broader network for work and social activities. Almost the same problematic is presented for displaced victims in new settlements. However, in this last case new settlements also present a lack of urban and basic services.

Transitional housing in the periphery is made with the same materials they sometimes receive for temporary shelters, local materials and through reuse of elements such as calamine sheets and wood panels from their previous dwellings. Furthermore, the living space responds better to the family in terms of area, internal dispositions and productive spaces included in the housing distri-

bution. In both cases the rupture of social ties is a shared problematic due to lack of connectivity. This last factor has a broad repercussion in the return of displaced victims to risk zones to have access to their crops and lands.

As it was studied, disaster management is a cycle where recovery measures blend into mitigation measures. In the case study, the lack of proper disaster management measures creates a second cycle. Unproper recovery projects leads people to go back to flood prone areas and stay vulnerable to further disasters in the future. Victims that return to meet their livelihoods still depend on mitigation measures that relate to big civil engineer structures that are not yet implemented and therefore become victims for the second time of a system that neglects them until the next big flood.

The built environment helps shaping society and has the power to improve life quality and reinforce sustainability, not only environmentally but also socially. It can be stated that post disaster architecture responses are not covering the victim's needs, nor getting familiar with their way of life and displacements. Thus, making them vulnerable not only to future disasters but to drawbacks in their development. To tackle this issue, decentralization of administrative and political structures is a field where profound changes would need to be imposed to give more capacity and independence to the authorities closer to the common people. Links between local authorities, private and social stakeholders should be mapped and strengthened to work articulately specially in the most critical situations. In a context of increasing individuality, post-disaster architecture has to aim for a collective response that provides flexibility and resilience in the face of future disasters and climate change, with special care for the most vulnerable people, often localized in the periphery.

The architect's responsibility in this process would be to study and implement innovative construction methods based on participation to better architectural and urban quality specially for communities where basic needs are not covered. Good architecture practices and assistance need to start addressing the people that needs it the most rather than only those who can afford it. The role of the architect should be oriented to work **with** the communities rather than just for them, in order to develop disaster responses that are appropriated by the people, legit to their social and cul-

tural practices and consequent to the site conditions in terms of resources and climate.

To encourage the empowerment of the community the architect's role would be to: give technical assistance for the self-builders, develop proposals that were previously consulted with the community, promote discussion with all the actors and stakeholders involved, study sustainable sources for local materials and available reuse and rehabilitation techniques. [45]⁸⁶ Taking the people's capacities and knowledge to improve, the architect would assume a role of coordinator and facilitator in making the affected victims take responsibility in their recovery by transforming their environment.



Houses in the hamlet of Chato Chico, 2022 | Lucia Ghersi

86 [45] Bolay, J.C.; Pedrazzini, Y.; Rabinovich, A.; Catenazzi, A.; Garcia, C.P., "Neo-liberal Arguments, Technology and Public Institutions: Environmental, Economical and Social problems in Cities of Argentine, Bolivia and Cuba"

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