

## Cities, Informality, Architecture, Urban Design and Engagement; investigating biological hazards, climate change and health adaptation strategies within vulnerable communities in Lisbon (and Bhopal)

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## Keywords

Urban regeneration, incremental housing, climate change adaptation, covid-19, community-design

### Partner Institutions

Associação Raízes de Santa Marta (de Corroios), ONG Building 4Humanity.

### Expected Future Partner Institutions

Divisão de Habitação da Câmara Municipal do Seixal (City Hall) ITT, University of Coimbra (LAETA, Associated Laboratory of Energy, Transport and Aeronautics), Roorkee, Department of Architecture & Urban Planning; Centre for Urban Governance, Bhopal; Universidade da Beira Interior

## OBJECTIVES

1. To explore effective methodological responses to the SARS-CoV-2 biological disaster through architecture and urban design using a community-design and community-building approach in order to prevent the spread of COVID-19 in slum areas;
2. To identify, from the householder's perception, potential impacts of climate change, and investigate, adopting a local resources approach, NBS design strategies to mitigate and prepare for natural hazards.
3. To study ways of assisting householders in finding the best design and building solutions for improving and incrementing their houses regarding health issues induced by climate change and the COVID-19 pandemic from an indoor environmental quality perspective.
4. To disseminate design guidelines and a catalogue of NBS among local and national organizations and public authorities to support further households and settlements in improving their living conditions and hence saving lives and money through urban regeneration.

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## ABSTRACT + IMAGES

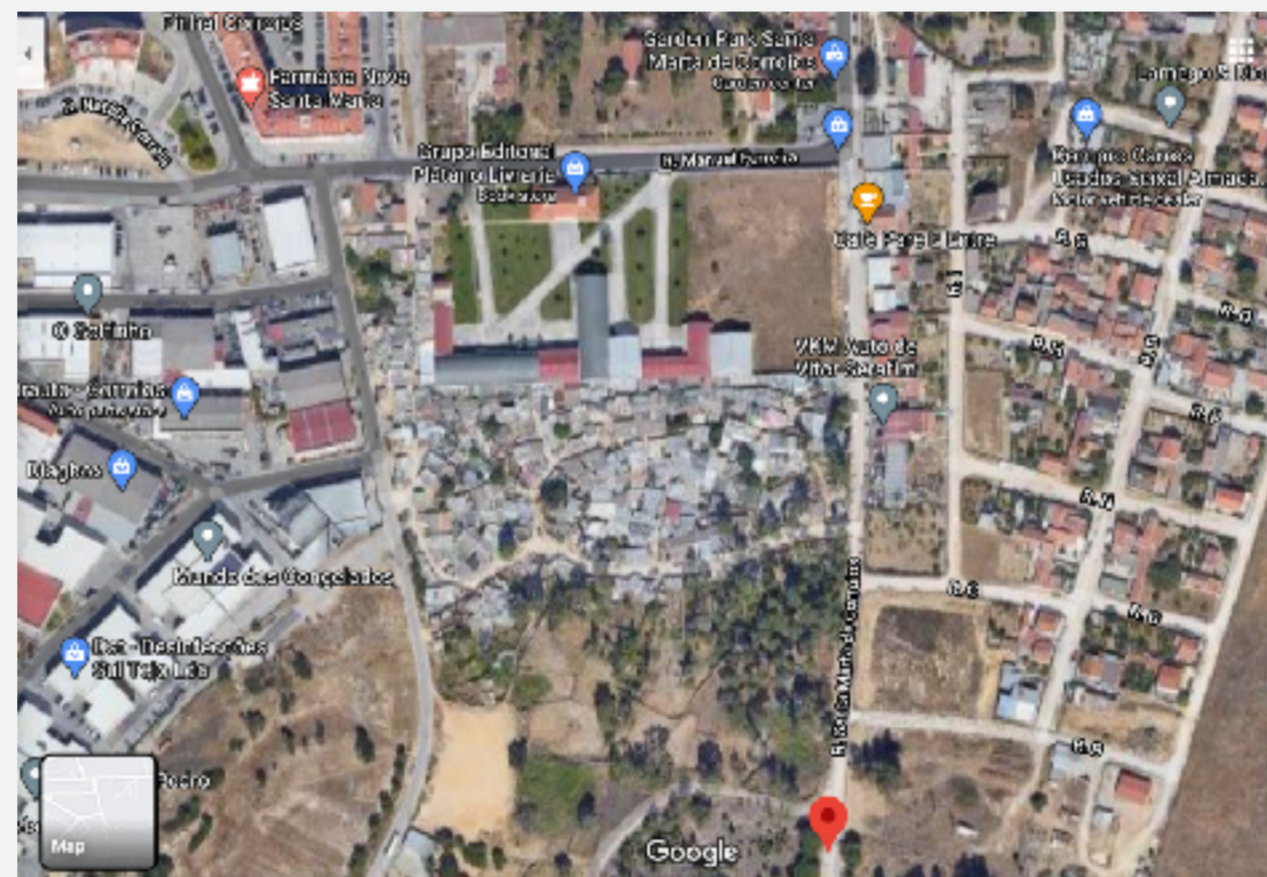
After one and a half year since the new coronavirus outbreak the vaccination against covid-19 is on its way sending a reassuring message to the developed countries struggling to recover their economies. Indeed, the COVID-19 pandemic severely impacted people's health, public healthcare systems, and economies at the local, regional and global level. To give a few but meaningful numbers, it took more than 3 and a half millions lives (19 thousand in Portugal, 300 thousand in India), more than 255 million full-time jobs (UN's International Labour Organization (ILO) disrupting the national and international economic networks and leading to a global loss that amounts to a drop of some \$3.7 trillion, or 4.4 percent of overall global gross domestic product (GDP). The U.S. has had at least 31 million confirmed cases of the coronavirus. It's not clear exactly what portion of patients experience its lingering symptoms, but researchers estimate to be 8-10%. (Ziyad Al-Aly, 2021).

Given the devastating impact of this major and sudden outbreak, the covid-19 should be regarded as a biological disaster and therefore, better managed from a disaster risk management perspective. The response to the COVID-19 is demanding and complex. Closing of borders, restrictions on circulation, cities' lockdowns, social distance, enforced quarantines, switching to home office, mass testing, all together may help limit the spread of SARS-CoV-2 virus. In fact, it did help. However, in urban slums, where population density is high, physical space is scarce, houses are degraded lacking basic infrastructure and wifi, and many rely on daily wage labour, often based on informal work, for survival, confinement, social distance as well as working from home, are not options. This project focuses on case studies in India and Portugal, namely in Bhopal and Lisbon. It builds upon cutting-edge literature on the topic and on previous action-research projects within vulnerable communities carried out by team members of both countries. The methodology will explore responses to the SARS-CoV-2 through a community-design and building approach and rely on local and nature based solutions (NBS). The approach will be cross-disciplinary, i.e. include research traditions from various paradigms of competence: academic (architecture, urban design, psychology, sociology, engineering and health), practice-based and communal/personal.

The project aims to develop architectural and urban design guidelines in the wake of the COVID-19 pandemic that consider local needs and constraints to improve the living conditions of the most vulnerable and marginalized people. The project will develop and disseminate innovative design strategies and outline design guidelines by working with the local communities to reduce potential impacts of climate change, mitigate and prepare for natural hazards, and prevent the spread of COVID-19 and further contagious airborne diseases in slum and deprived areas. In the first step, the Portuguese team will focus on an informal settlement in the metropolitan area of Lisbon with the support of a local association, the department of Housing of the Municipality of Seixal and the NGO Building 4Humanity (with headquarters in Coimbra). The team is composed of researchers with different background and from different areas: architecture (with specialization in sustainable design and health incremental housing; architecture and health with focus on lessons from the sanatoriums for tuberculosis; and 3D building performance simulation, disaster-risk reduction and design for climate change), urbanism (with a focus on the right to the city, participatory-design), sociology, medicine (respiratory infectology), psychology, mechanical engineering (with expertise in airborne transmission, environmental quality and health) and digital design (with expertise in UX).

Expected outputs for a 10 months period include local surveys, outreach activities within the community, the draft of a manual with design guidelines, the conceptualization of a middle application to involve the residents in design and air quality simulation, the publication of a book chapter in a Springer book (which are under our coordination) and an article on a top journal (scopus indexed) as well as an international zoom conference, in collaboration with Indian partners in Bhopal, on the relationship between architecture and covid-19.

In the second stage, which goes beyond the scope of this call, both the Portuguese and Indian teams will interact, exchanging the preliminary results of the first studies based on the fieldwork carried out on both sides. Working collaboratively, the two teams will build an international project to be submitted to FTC in the next call Portugal-India, scheduled for the Summer of 2022 (first edition was in 2020).



## SCIENTIFIC RELEVANCE FOR THE DISCIPLINE

There are many studies focusing on the participatory design methods, incremental housing, slum upgrading, as well as climate change origins and impacts. Recently, significant research has been conducted on the relationship between Covid-19 and public health measures. Further, investigations on airborne transmission factors, both from a clinical and an indoor environmental quality standpoint, tackled the ways in which Covid-19 can spread inside buildings and public transportation systems.

However, there is still an important gap regarding cross-disciplinary studies that can bridge design, natural based solutions, health and indoor virus dissemination. Indeed, the cultural, the psychological, the environmental and the spiritual, besides the clinical, permeate architecture and urban design. So, if we want to tackle the problem raised by CC and Covid-19 through improving the design and building of home and public areas, an encompassing framework should be considered.

This research intends to fill an important gap in architecture and urban design by adopting a social inclusive & community-design viewpoint and expanding the potential of NBS towards climate resilient and healthier urban (slum) upgrading and incremental housing.

## EXPECTED ECONOMIC AND SOCIAL IMPACT

Both the impacts of climate change and Covid-19, namely regarding circulation of persons and goods, called attention to the need for a sustainable degrowth and a new approach to design, one focused on people and health, instead of progress and comfort. The current climate and sanitary emergencies showed that public health is strongly linked to the economies at the local, regional and global level and that crisis are cascading. As we have experienced in the past one a half year, when public health is at risk, not only the wellbeing of individuals is at stake, as they cause devastating impacts in terms of casualties and overloading of healthcare systems, but the current lifestyle and livelihoods can be seriously compromised by the disruption of local basic services and national and international networks that directly and indirectly feed the labour market and sustain our way of living. By contributing to improve the practice this project is supposed to not only impact positively in the building capacities amongst vulnerable communities' residents as well as influence public architecture, housing and sanitation policies

## RESEARCH PLAN AND TASKS

Community-design is today an emerging participatory design practice that brings the householders to the core of the design process, moving from the idea of *people addressed* to *people involved*. This means to architects and urban designers to often play an intermediate and cultural role, refraining from a design-control centred approach; particularly in informal areas and incremental housing process, which currently represents a very significant part of the housing production within the urban fabric, with nearly 1 billion people living in informal areas and self-construction or aided-self being the predominant across the peripheral areas of the big and mega cities of underdeveloped and developing countries. (Martins, 2021)

NBS represents a new paradigm in climate adaptation and urban regeneration responses which architects & urban designers are still learning to deal with, after several decades of delusional abundance of technology and resources. EU programs highlight the potential of NBS and promote its adoption by European cities through joint projects, shared knowledge platforms and communities of practices:

*"There is convincing but fragmented evidence that nature-based solutions can significantly enhance the climate and water resilience of cities. Furthermore nature-based solutions, by reshaping the built environment, can enhance the inclusivity, equitability and liveability of the cities, regenerate deprived districts, improve mental and physical health and quality of life for the citizens, reduce urban violence, and decrease social tensions through better social cohesion particularly for the most vulnerable groups e.g. children, elderly and people of low socioeconomic status. The challenge is therefore to provide a robust, EU-wide evidence base and develop a European reference framework on nature-based solutions for regional and local city authorities, communities, enterprises and other stakeholders about the benefits, co-benefits, cost-effectiveness and economic viability of these solutions to enhance on the one hand climate and water resilience in cities and on the other hand to address inclusive urban regeneration in cities and thus promote their large scale deployment (...)."*

In *Demonstrating innovative nature-based solutions in cities*

<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/scc-02-2016-2017>

The current EU initiative of the New European Bauhaus further emphasizes the goal of achieving a balance between design, sustainability, equity and social inclusion in the reshaping of our cities of the post-pandemic era. Please see: [https://europa.eu/new-european-bauhaus/about/about-initiative\\_en](https://europa.eu/new-european-bauhaus/about/about-initiative_en)

The project will form an interdisciplinary team of architects, engineers, designers, doctors, nurses, sociologists and psychologists to work together with the community in the low-income settlements in Lisbon, Portugal, and afterwards in Bhopal, India. The project will develop, in partnership with the local municipalities and residents associations, the Community Living Lab (CLL) which will enable the interdisciplinary research team and the stakeholders to discuss, organize and engage in decision-making processes, sanitation issues, mapping and design thinking.

The work starts with establishing a partnership with the community members to enable them to be involved in gaining knowledge and experience and fully engage in onsite works. Physical CLLs are to be developed with careful attention to ethical issues and include local stakeholder and academic representatives. Monitoring systems constitute an essential part, and the results will be part of the evidence base.

In the second stage the CLL will provide room to accommodate and support the different activities, such as collaborative surveys, co-mapping of public spaces and housing and peoples' vulnerabilities such as health issues related to disaster-risk, indoor environmental quality, and airborne transmissions, in particular (Correia, 2020). In next stages the CLL will allow for ICT-based incremental housing and building performance simulation, building and other training skills. As a focal point of the action-research the CLL aspires to become a place of attachment to the local community, therefore supporting the environmental, cultural, social and economic sustainability of the project. (Shrestha et al 2021).

Arrangements have been made to reuse an abandoned building in the community of Santa Marta de Corroios, municipality of Seixal, in the metropolitan region of Lisbon, to lodge the CLL. While this happens (the remaining pandemic constraints may force some delay) the CLL will work either physically in alternative spaces, or in a virtual format, by the usual meanings that we all get used to during covid-times, namely online video communication and platforms.

The third stage includes the definition of a field-based tested methodological framework and the conceptualization of an app to empower householders. Designer with user friendly principles through advanced UX and automatic design methods, this app can potentially identify and map health issues. And, eventually, generate slum upgrading and incremental housing responses to be visualized by the residents.

The final stage is the planning, design and deploying of architecture and urban design nature based solutions (NBS) followed by its monitoring and evaluation. This process involves the cooperation between partners and communities addressed at all levels during the project period and beyond.

The women members of the families will be prioritized as interlocutors as they are the ones who spend most time inside the houses and should be heard while designing their space. Besides, there is scientific evidence that they hold stronger ties with the family and are more reliable when it comes to engaging in aid-self help processes (Martins 2021). Six women will be selected from the local community to work together for the duration of the project to deploy NBS housing and urban design solutions. The project will further develop a mobile app to map the pathological manifestations, lack of sunlight and natural ventilation, and other risk situations. This evaluation will contribute to the future planning of actions in intervention projects in informal settlements. A mapping of the house problems will be done to make a diagnosis by means of building simulation modelling technique. The project will examine the local conditions through surveys and collaborative mapping to address climate change, disaster-risk issues, sanitation and, in particular, virus contamination factors.

It will explore the optimization of sun exposition and the prevailing wind conditions to increase sunlight and natural ventilation not outside and indoor (WHO 2021). Next step comprises urban upgrading and incremental housing NBS-based. The eventual proposed solutions will reflect principles of building back better, considering bioclimatic architecture principles and architecture for adaptation to climate change. But mostly, they will learn from previous knowledge accumulated with the healthcare units specialized in breathing issues and virus or microbial contamination, such as the sanatorium in Portugal and worldwide, which were specifically designed to help the cure of tuberculosis, a disease that presents very similarities with the COVID-19. The project will disseminate the findings during all stages for knowledge creation through capacity building of households but also of local small contractors as well as other communities engaged in works of similar nature. Communication documents will be delivered periodically in order to raise awareness over the community and society in general as well as to marketing the project. A website will keep the information of the project updated serving as a platform to share knowledge and exchange. In the following stages, the Portuguese and Indian teams will work collaboratively in both locations and discuss solutions together. Different missions will be conducted to allow for direct observation of the two different realities. These missions will be the moment to improve the dialogue, discuss solutions in loco with the stakeholders, and organize bilateral enlarged meetings, including workshops, seminars and one conference.

This project builds upon previous international joint project by the CIAUD/FAUL and various European universities, namely the ARCADIA (not granted)

Horizon 2020

Call: H2020-SCC-2016-2017  
(SMART AND SUSTAINABLE CITIES)

Topic: SCC-02-2016-2017

Type of action: IA  
(Innovation action)

Proposal number: 776696-1

Proposal acronym: ARCADIA 2030

Please visit:

<https://www.academia.edu/49062355/>

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## EXPECTED SCIENTIFIC RESULTS

1. Design guidelines and pre-tested building techniques that can be disseminated to further settlements, and stakeholders, in India, Portugal and elsewhere to provide detailed information for residents to implement the design intervention in their own homes. These guidelines can also be used by the government departments, NGO and other agencies working in slum development;
2. Action-research products in the form of publications, audio and video documents, a documentary containing the cases of Bhopal and Lisbon;
3. The design of a friendly-user mobile application that responds to the need for housing improvements in houses built informally with minimal technical assistance; and
4. Outreach activities, including seminars and workshops for the local communities to share their experiences and knowledge which could be imbibed by other communities working to manage similar biological disasters and address health concerns.

## BUDGET: € 7.500,00

Relates to fieldwork, basic hardware, communication, analogical and digital equipments, design, cad and printing services, as follows:

- a) travel expenses: 1800
  - b) digital equipment: 2700
  - c) software: 600
  - d) design services: 1250
  - e) web-services: 300
  - f) stationery and printing shop: 500
  - g) ink cartridges: 100
  - g) insurance: 250
- Total: 7500