

Exploring the Environmental and Social Sustainability of Natural Cities

Challenges and Opportunities of Unfinished Buildings Development

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DOI: 10.37199/o41009130

Abstract- As the consequences of climate change become increasingly apparent, it is imperative to enhance the efficiency and control of the construction sector to adapt and mitigate the crisis. This essay examines the complex relationship between informal settlements and sustainable urban development. It emphasizes the significance of adopting a human-centered approach to comprehend and tackle the challenges encountered by these settlements. Furthermore, it acknowledges the interconnectivity of urban informality, human nature, and architecture, underscoring the need to observe. The concept of Natural Cities, which evolved from informal settlements, challenges the traditional divide between society and nature by highlighting their interdependence and coexistence within urban spaces. Sustainable cities embrace this interdependence by following the principles of sustainability and environmental stewardship, striving to strike a balance between the needs of people and the requirements of the natural world.

The article addresses the challenges of abandoned or stalled construction projects in Natural Cities, which can be overcome with the right guidelines and boosts, by presenting a theoretical analysis and suggesting several development approaches for unfinished buildings in these settlements. These practices are based on the principles of "build nothing, less, clever, and efficiently" by the World Green Building Council. The article evaluates the approaches in terms of costs, greenhouse gas emissions, and their alignment with the UN's sustainable development goals. Public investments and services can be encouraged in these structures to incentivize sustainable development, ultimately benefiting the residents of informal settlements who are most affected by these challenges. Empowering and including the residents in the planning and decision-making processes is crucial for success.

A human-centered approach that recognizes the interconnectedness of urban informality, human nature, and architecture is pivotal in realizing sustainable urban development in informal settlements. By considering the symbiotic relationship between urban and natural elements and involving the community in decision-making processes, we can foster inclusive and resilient natural cities that harmonize with their surroundings and enhance the well-being of their residents.

Keywords:

Natural cities, Human-centred approach, Urban-nature relationship, Unfinished buildings, Sustainable development.

Introduction - It is essential to enhance the efficiency of the construction sector and its interaction with ecosystems to adapt and mitigate the environmental crisis, as the impact of climate change is becoming more evident every day. Considering that

the construction sector causes 37% of global energy-related CO2 emissions (UNEP & GABC, 2021, p. 15), managing the city's growing needs with solutions designed through a Life Cycle Thinking approach is essential. Additionally,

promoting social sustainability in the construction sector is fundamentally vital for maintaining human rights within the building lifecycle (WGBC & BPFP, 2020), including the well-being of workers, the involvement of local communities, and the consideration of future generations. It is crucial to ensure a more equitable and sustainable built environment.

In the last semi-century, not-afforded and self-constructed settlements, characterized by inadequate infrastructure and limited access to essential services, have significantly increased in many places worldwide. This phenomenon, usually known as "informal settlements" (Aliaj & Kacani, 2020, p. 5; Beard et al., 2016), has important implications for sustainable development in the regions where it occurs, as it could negatively impact not only the environment but also public health and social well-being. Considering the foundation of these settlements, it is difficult to provide consistent measurements, but the Departments of Economic and Social Affairs of the UN (2019) has reported that in 2018 one billion people were living in slums or informal settlements around the world. Moreover, considering the increasing global growth trend, the population in these areas might double in 2030 (Jones, 2019), significantly escalating sustainability issues.

The lack of basic infrastructure that leads to environmental degradation, water shortage, soil contamination, and air pollution could increase in the following years, with severe implications for resi-

dents' health, clearing green spaces and destroying natural habitats, further exacerbating environmental and social degradation. Addressing these issues will require a holistic approach considering the residents' needs and the government's role in promoting sustainable development. Architects and urban planners will likely have to consider different sustainable scenarios to develop these areas, considering housing beyond urbanization issues. It is crucial to change perspective on urban informality and recognize its strong connection to the human element. With this new perspective, Sotir Dharmo elaborated on the notion of a Natural City «as formal/informal intertwining, organically emerged, self-organized from the bottom, and that potentially embodies dynamics that may lead to co-evolution with other parts» within a more extensive system (2021, p. 27), describing a fundamental requirement for sustainable development. The unpredictable emergence of order in the city from human properties requires considering the interrelatedness of multiple scales as essential to overcoming the linearity of spatial analysis (Dovey, 2012). Natural Cities could be viewed as a significant and missing link between the problems posed by the growth of contemporary cities and architectural sustainable design possibilities that need to be observed and investigated, not just in urban studies or planning. Another scholar on this topic, Antonino Di Raimo (2021), views informality as an interface between different dichotomies,

such as the urban and the architectural, the legal and the illegal, and the individual and society. He claims that informality is already part of our everyday life and that its physical and morphological aspects are relatively unexplored in the field of architecture.

Unfinished and Abandoned Buildings in Natural Cities

The discussion on sustainable and responsible practices emphasizes the need to prioritize a human-centered approach to observing and understanding patterns. The stigma and prejudice attached to informality prevent it from being part of the architectural agenda and call for greater attention to studying its human-sized architectural development to achieve a Natural City. The subject matters of this article are the unfinished buildings and abandoned or

on-hold construction work, which might have been delayed through the years at some stage of their life cycle. These kinds of bare structures are often diffuse in informal settlements worldwide and often have a negative environmental and social impact. The Italian and Balkan peninsulas offer many examples of those uncompleted dwellings generated by the evolution of human traditions, needs, and relationships. In South Italy, where a portion of building activity has been placed in partial or complete illegality producing degradation of the landscape and often in seismic and hydrogeological risk areas (Costanzo & Ferrara, 2022, p. 174), many people left for better opportunities in the 50s. Still, homesickness brought them back with their savings invested in new building construction in their hometown. However, most of these self-built dwellings

often remained empty, with many unfinished due to a lack of planning and building sanctions (Fig1-3; Guida, 2017). A very similar phenomenon happened in Albania, where after the communist period, the dynamics of urbanization and internal migration have given rise to informal settlements on the outskirts of cities (Lerch, 2016). The transition to a market-oriented economy in the early 1990s spurred rural-to-urban migration, leading to the establishment of makeshift dwellings. These informal settlements often grapple with substandard housing, inadequate infrastructure, and limited access to basic services. Legal and regulatory challenges, coupled with economic disadvantages and cultural influences, contribute to the complex context of these areas. While the Albanian government has initiated efforts to address these challenges and improve living conditions,

the precise situation is dynamic, requiring updated insights from recent reports and studies (OECD, 2021; BTI, 2022). Starting from the '90s, after an uncontrolled occurrence of internal migration from rural areas, the settlements next to the major urban centers are marked by the presence of multiform on-hold buildings disorderly, scattered, and indifferent to the context. Often these buildings are the result of the emigrating owner's desire to recreate the patterns of progress and well-being they experienced abroad. This nostalgia, combined with the use of atypical building techniques, makes these buildings a symbol of our time (Fig4-6; Menghini, 2016, p. 20; Baboçi, 2016a). Informal structures typically adhere to a recognizable blueprint, initially constructed using a standard structural model, which is then modified and extended in accordance with the requirements and financial means of



Fig1-3 / Photos of unfinished buildings in Cagnano Varano (IT) from the project *The Waiting City*
source / Alessandro Guida



Fig4-6 / Photos of on-hold construction work in Finiq (AL)
source / the author



Fig. 7-8 / Photo of inhabited dwelling in Lezhe (Albania) object of Proposal 1, and the development project devised by Oddo and Barrocco (©Pastore, D., 2016. Edizioni Giuseppe Laterza s.r.l.).

the proprietors. These bare structures are widely diffused in the Balkan Peninsula, even in the areas in southern Albania to which this volume is dedicated, as consequences of neglect and disregard for norms and regulations, or otherwise, as consequences of the organization from individual relationships.

Objectives and Methodological Approach

This study aims to analyze the environmental and social sustainability of some building scenarios in Natural Cities, focusing on the challenges and opportunities presented by unfinished buildings. The primary objective is to explore viable development approaches for abandoned or stalled construction projects within informal settlements, considering the principles advocated by the World Green Building Council. The study also seeks to evaluate these approaches in terms of their costs, greenhouse gas emissions, and alignment with the United Nations' sustainable development goals (SDGs). To achieve these objectives, a theoretical analysis is conducted, and several development proposals are presented for in-depth examination.

Furthermore, a comparative analysis is conducted on the proposed development approaches, utilizing an Embodied Carbon Assessment (ECA) methodology. This approach supports an evaluation of the potential environmental emissions associated with the construction and lifecycle of the proposed building envelopes. ECA is a widely accepted approach for evaluating

the GHG emissions impact of products or systems throughout their entire life cycle. To ensure the accuracy and relevance of the assessment, the methodology aimed to gather data primarily from the Albanian market or, when unavailable, from the Southern European one. This regional focus allowed for a more realistic representation of the environmental impacts associated with the project, as it considered factors such as local manufacturing practices, transportation distances, and available resources. The study employs One Click ECA® software.

This methodological approach is chosen to provide a robust foundation for the subsequent analysis of specific abandoned building development proposals, offering a structured examination of their environmental and social implications. Analysis of a few abandoned building development proposals

A volume entitled "Evoked. Architectural Diptychs", edited by Domenico Pastore (2016) aimed to showcase the key characteristics of the architecture found in the informal settlements that emerged in Albania from 1991 onwards. The book also presents a perspective on the future of the previously described reality. This section delves into proposals put forth by designers and architects for abandoned or unfinished buildings in the volume. By exploring these ideas, it's aimed to inspire innovative approaches to developing these Natural Cities' structures in a more environmentally conscious manner.

In this initial phase of the methodology,

the technological systems proposed for the new building envelopes were supposed to consider their relevance to the project and their potential environmental implications. Each system was analyzed to determine its specific components or materials that would be utilized in the construction process. Following the identification of individual components, the approach proceeded to apply the Embodied Carbon Assessment (ECA) methodology. The assessment focused on the impact factor that describes greenhouse gas emissions, considering the entire life cycle, from raw material extraction to manufacturing, construction, use, and eventual disposal or recycling.

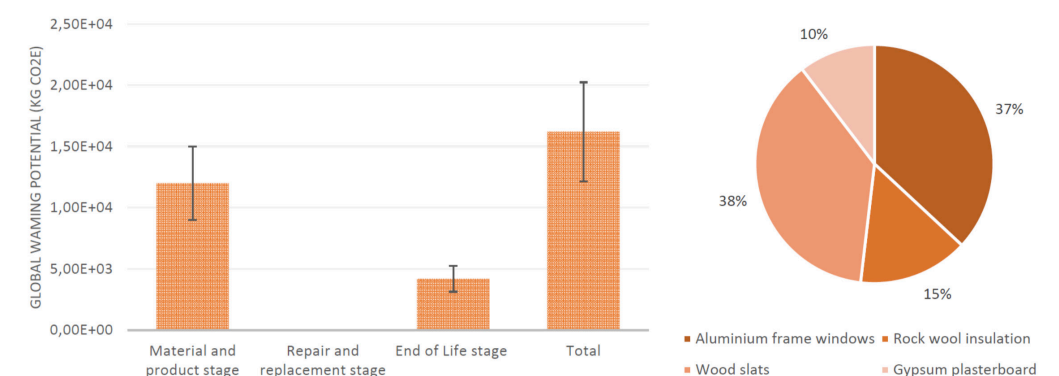
By applying this approach, the environmental assessment of the uncompleted building development project can be presented with a holistic evaluation of its potential impacts. The proposal, with

the support of the ECA results, allows for qualitative evaluations, putting individuals in front of potential options. This supports EVOKED's request for a step in the individual construction process.

Proposal 1

The first case study submitted to the analysis is a development proposal for a two-floor inhabited dwelling in Lezhe (Albania). The authors of the proposal, Oddo and Barracco, noticed how this uncompleted starting frame contains minimal signs that can suggest the same building design and final realization. Their proposal is based on the starting draft, marked by the concrete frame.

The project's volume is mainly enclosed, with a line drawn between the built elevation and the garden in the landscape. The design seeks to conquer both the horizontal mountain line and the view to-



Graphic 1-2 / Histogram of the embodied carbon potentially emitted in the various stages of the life cycle by the proposal 1 building envelope, and its distribution over the different materials and elements. source / the author



Fig9- 10 / Photo of an abandoned residential building in Tirana (Albania) object of Proposal 2, and the development project devised by Baboçi
source / Pastore, D., 2016. Edizioni Giuseppe Laterza s.r.l

wards the sea, with a large skylight providing zenithal light in the middle viewport. Oddo and Barracco suggest that the incomplete nature of the existing serves as inspiration for the architecture to be auto-completed, with the giant order mediating between artifice and nature (2016, p. 50). Overall, the proposal explores the concept of incompleteness and how it can be used as a source of inspiration in architectural design.

It appears that this design aims for simplicity by following the existing lines, which helps conserve building materials. Utilising materials like wood slats, gypsum plasterboard, and rock wool insulation panels can effectively decrease the building's carbon footprint (Francart, Widström, & Malmqvist, 2021). Moreover, choosing locally sourced or recycled materials can also contribute to reducing transportation emissions and boosting the local economy.

When calculating the carbon footprint using the ECA methodology, it is important to consider that using wooden materials will result in biogenic emissions being released at the end of the facade's life cycle. When organic materials decompose, they emit CO₂, which must be taken into account when assessing the environmental impact and carbon footprint of construction products and materials. In this project, it can be seen that part of the emissions are transposed at the end of its life thanks to the use of wooden materials, such as brise soleil systems for example.

Proposal 2

The given object of this proposal has been treated by Baboçi as non-existent, by camouflaging it with the surrounding environment and covering its facade with reflective glass panels. Similarly, a prototype situated on top of the hill has been treated in an analogical manner, this time including a roof garden. The intervention in this case is a conceptual gesture that critically addresses the arrogance and lack of sensitivity regarding the built environment's surroundings. This reflection must be a priority as it speaks to an essential change in mentality and cultural approach towards nature and constructive behavior (Baboçi, 2016b, p.84).

Elements and materials considered in the carbon footprint of the building envelope: Generic extruded profiles for window and door frames, 50% recycled content, thermal breaks excluded (110 kg); Glass reflective solar control CVD coated clear, 8 mm (160 m²); Standard Clear float glass, 8 mm (160 m²); Anodised aluminium sheets for wall cladding, 0,7 mm (40 m²); Generic Gypsum plasterboard, regular (40 m²; from an Albanian EPD); Generic Rock wool insulation panels, unfaced (40 m²; from an Albanian EPD).

The utilization of dry construction systems, as proposed in Baboçi's project, is a fundamental aspect of the new glass facade of this proposal. Such systems offer a range of environmental advantages, particularly since they are produced off-site within controlled facilities and just assembled on-site. This results in a more

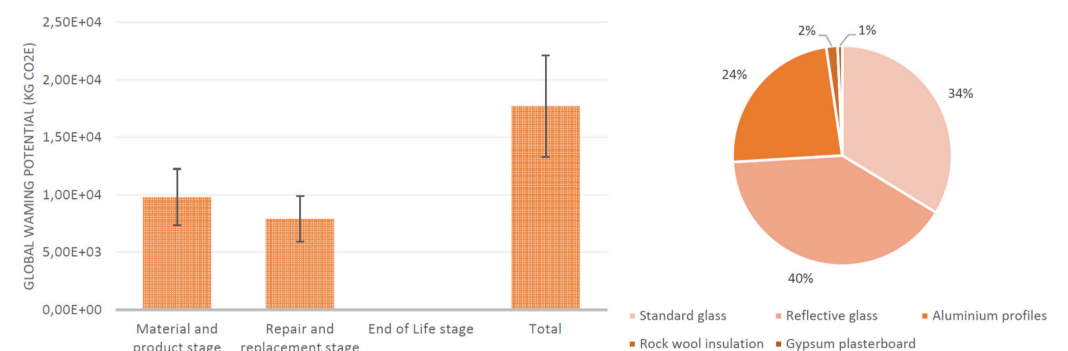
sustainable construction process, which is highly dependent on various factors, including the distance between production and construction sites, project requirements and timelines, and market circumstances surrounding construction materials and components (Pons, 2014). Moreover, there is a possibility that in the forthcoming years, several companies in Albania will utilize locally sourced raw materials or recycled materials to create these products.

However, it has not yet been unequivocally defined whether the use of these systems also leads to economic advantages, and the construction costs for a highly sustainable building are about 15% higher (Van Der Meulen, 2022, p. 106). Van Der Meulen's "Building With a Positive Footprint" presents an economic strategy for eco-friendly construction that takes into account the residual value of building ma-

terials as future revenue. This forward-thinking approach requires a higher initial investment, predicted between 5 and 10% of construction costs in 2022. However, as the availability of raw materials decreases and new extraction taxes are enforced, this percentage is expected to increase in the coming decades. By prioritizing sustainability and disassembly in the design process, residual value can be maximized, and building estimates should reflect the advantages of sustainable choices to prevent hidden costs. Building costs are intricately linked to residual value and compensation costs (Van Der Meulen, 2022, p. 107).

Proposal 3

This photomontage proposed by Vokshi was meant to be an architectural provocation, serving as a commentary on the impossibility of returning to the original



Graphic 3-4 / Histogram of the embodied carbon potentially emitted in the various stages of the life cycle by the proposal 2 building envelope, and its distribution over the different materials and elements.



Fig11-12/ Photo of abandoned storage and residence in Fier (Albania) object of Proposal 3, and the development project devised by Vokshi source / Pastore, D., 2016. Edizioni Giuseppe Laterza s.r.l

condition of the landscape before the building's construction. The proposal aimed to achieve the opposite of what the construction had done to the landscape by integrating it into its surroundings and completely covering it with vertical greenery. This approach shifted the focus from the construction itself, which had previously been seen as polluting the landscape, to a new source of positive landscape hierarchy (Vokshi, 2016, p. 120).

Elements and materials considered in the building envelope carbon footprint assessment:

Green wall system (260 m²); Gypsum plasterboard, reinforced, water resistant for exterior wall use (20 m²); Aluminium frame window, 60 m²; Generic Gypsum plasterboard, regular (260 m²; from an Albanian EPD); Generic Rock wool insulation panels, unfaced (260 m²; from an Albanian EPD); Generic Rock wool insulation panels, unfaced (260 m²; from an Albanian EPD).

Even if this design has been conceived with a provocative aim, it offers the possibility to hint at a growing façade technology, getting popular worldwide, the green facades. Also known as living walls or vertical gardens, these envelopes can provide numerous benefits when applied to existing buildings in warm-dry summer Mediterranean climates. That includes improving thermal comfort and reducing energy consumption by shading the building from direct sunlight. Green shelters can also enhance air quality by absorbing pollutants and releasing oxy-

gen. Additionally, they can help mitigate the urban heat island effect by providing a cooling effect through evapotranspiration. Green facades can also enhance the aesthetics of the building and surrounding urban environment while providing habitats for wildlife. Finally, they can contribute to the overall sustainability of the building and informal area by reducing the environmental impact and promoting biodiversity (Nguyen et al., 2019; Vásquez et al., 2020).

Furthermore, refurbishing an existing building, as all selected projects propose to do, is generally considered more sustainable than building new ones because it avoids the environmental impacts associated with the production and transportation of building materials, as well as the energy consumption required during the construction process. Additionally, refurbishing can extend the life of a building, reducing the need for new construction (Gaspar & Santos, 2015). This approach is known as adaptive reuse, and it has several advantages, including reducing the demand for new construction, preserving cultural heritage, and reducing waste. Adaptive reuse can also lead to economic benefits, such as lower construction costs and increased property values (Hasik et al., 2019). Reusing existing structures without building anything new can be even more sustainable, as it avoids the additional energy and material resources required for refurbishment. In many cases, existing buildings can be adapted for new uses, such as converting a former

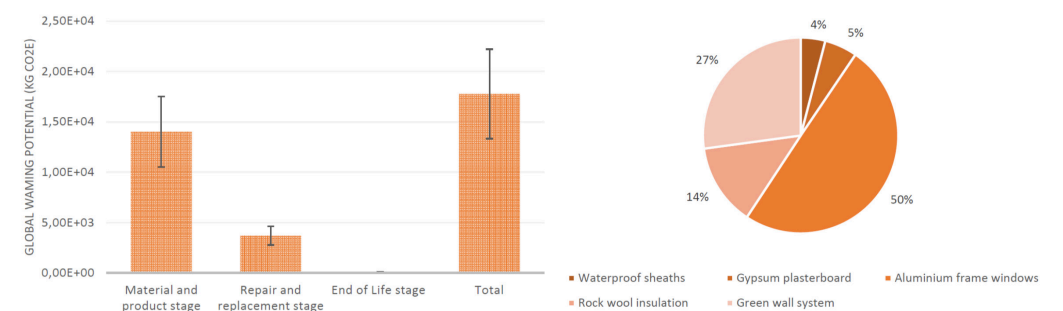
industrial building into a residential or office space, avoiding the need to build new structures from scratch. This is the case of the last proposal presented.

Proposal 4

A study carried out by Koçollari has identified various themes that suggest the need for a reinterpretation of bare reinforced concrete structures that have a positive impact on the environment and blend well with the natural surroundings. Some of the issues that need to be addressed are the sale of agricultural products on the roadside, irrigation needs of agricultural lands, lack of water supply infrastructure in rural areas, and the negative impact of concrete structures that are built without any regard for the environment. A possible solution could be the creation of public fruit stations where farmers can sell their products without resorting to roadside

sales (Koçollari, 2016, p. 54). This kind of place could also assume strategic importance from a community-based ecotourism perspective, which is an alternative tourism that must embrace individual ideas within the community. Đukić et al. (2014) conducted a comparison of ecotourism initiatives in protected rural areas of the Balkans and created a model to assist future initiatives. The aim was to cater to the needs of both local and foreign tourists and present the nearby villages as appealing tourist spots.

Additionally, Koçollari claimed how the upper level of the bare structures can be converted into containers or rainwater collectors to address the lack of water supply. This collected rainwater can be used for irrigation, filtered for domestic needs, and even serve as a community 'swimming pool' during hot seasons (Koçollari, 2016, p. 54). However, it is crucial to recognize



Graphic5-6 / Histogram of the embodied carbon potentially emitted in the various stages of the life cycle by the proposal 3 building envelope, and its distribution over the different materials and elements source / the author

that the structural integrity of abandoned reinforced concrete experiences a significant decline after 6 years (Ismail, Yew, & Muhammad, 2016).

Discussion and Recommendations

All these presented proposals align with the Building Council's principles of building efficiently and sustainably, as well as the UN's sustainable development goals. The construction volumes and materials used determine how well they meet these goals. It can also help to respect the natural environment and improve the social environment in Natural Cities.

The axiom "Build Nothing, Build Less, Build Clever, Build Efficiently" is a guiding principle for the construction sector to achieve sustainable development and reduce its carbon footprint. It means that the sector should avoid unnecessary construction, minimize the use of materials and resources, design structures that are adaptable and resilient, and optimize the performance and lifespan of buildings. This axiom was reported for the first time by the UK Green Construction Board in 2013. Then, many intergovernmental panels, non-profit organizations, and global networks, such as the World Green Building Council, consolidated it (WGBC, 2019; Ness, 2020). Even if it could be possible to imagine turning around, the fact that every building inevitably has a harmful impact and focuses on making a positive contribution (Van Der Meulen, 2022). Therefore, the Sustainable Development Goals (SDGs) offer a comprehensive framework for sustainable development, which is highly useful for designing potential scenarios for informal settlements. These goals are specifically designed to address the various challenges that society faces, such as environmental degradation, poverty, inequality, and lack of access to basic services. By utilizing the SDGs as a guidance framework, planners and designers can strive to create more sustainable and equitable futures for these communities by improving their quality of life, promoting sustainable use of resources, and enhancing access to basic services like healthcare and education. Moreover, the SDGs provide a means to track progress toward these objectives and hold governments, businesses, and other stakeholders accountable for their actions.

Below are some insights and recommendations on how to address the challenges of Natural Cities sustainably and

inclusively, based on the indication of the SDGs. These could inform policy decisions, guide urban planning processes, and support the development of effective programs and initiatives to improve the lives of informal settlement residents. These are regarding work opportunities, improving dwellings and infrastructure, promoting cultural heritage, and promoting sustainable land and water use.

- To improve work opportunities in the area, the local government should look for synergies and build stronger multi-stakeholder partnerships. Sharing knowledge, expertise, technology, and financial resources can help create more jobs for youth while ensuring safe working conditions.

- To improve dwellings and infrastructure, the government should fund projects that provide basic sustainable infrastructure with efficient resources and environmentally friendly technologies. They should also invest in domestic technology development research, encourage efficient home designs that combine energy-efficient constructions, appliances, and lighting, and support solar power projects for schools, homes, and offices. Additionally, the public transport system in the region should be improved, using environmentally friendly modes of transport.

- To promote the area's heritage, the government should advocate and support the development of sports and recreational spaces, which help build stronger, healthier, happier, and safer communities. They can also educate people on the cultural and natural heritage of the area and encourage them to visit heritage sites and post positively about them. Small community groups can brainstorm ways to ensure safe and accessible public spaces, particularly for women, children, elderly people, and people with disabilities.

- Finally, to promote sustainable land and water use, the government should support organizations that give water to areas in need and donate to projects that require funds for digging boreholes, installing pipes and pumps, and providing maintenance training to communities. They should also avoid using pesticides that end up in rivers and lakes, which can harm wildlife, and fund projects to rehabilitate lands.

By implementing these suggestions, the local government can create a healthier, more sustainable, and more prosperous community. Anyway, it's important to acknowledge that this article presents

a general overview of a complex phenomenon that requires further investigation and clarification. It is not intended to be exhaustive or definitive but rather to stimulate discussion and exchange of ideas among researchers and practitioners. It's essential to understand that carbon emissions and social injustice can be reduced at any point and any scale in the building life cycle process, but the opportunities are more significant the earlier they start. Helping owners avoid unsuitable and untenable constructions with their associated costs, emissions, and malaise is critical in reducing avoidable environmental and social impact and creating new business opportunities for consultants, contractors, and suppliers. Co-evolution theories facilitate evolution.

Conclusions

Dhamo and Di Raimo share a common view that a human-centered approach is necessary for observing and understanding the patterns of informal settlements (or natural cities) as an essential aspect of contemporary cities. This perspective is needed to develop sustainable cities because it recognizes the strong relationship between urban informality, human nature, and architecture. This definition might have seemed odd a few decades ago, caused by what Neil Smith (2005, p. 11) in the foreword of "In the Nature of Cities" featured as the «globally destructive [...] common-sense separation of society and nature» of the last three centuries. However, the process of urbanization consists of combining opposing elements. It has constituted the city and countryside, society and nature, emerging from the interconnected realm of human social existence. Simultaneously, the «urbanisation of consciousness» shapes both Space and Nature (FitzSimmons 1989, p. 108). In this frame, architecture plays a crucial role in mediating and managing these relationships, not only as the art and science of designing space but even as part of the art of living (Ballantyne, 2002, p. 2). The indissoluble relationship between urban, nature, and architecture can be seen in the way that these three aspects of human society are deeply intertwined and constantly influencing each other. Urban areas are shaped by the natural environment in which they are situated, and architecture is a means of mediating and responding to this relationship, following the needs of its inhabitants. As we have seen, the design of buildings and public

spaces can consider the local climate and ecology, incorporating elements such as green roofs, rain gardens, and other features that enhance biodiversity and support natural processes. Similarly, urban planning can be guided by principles of sustainability and environmental stewardship, seeking to balance the needs of people with the needs of the natural world.

Abandoned or stalled construction projects can harm the local economy by reducing investment and employment opportunities. They can also result in a loss of tax revenue for the local government. However, this process can be reversed. These development proposals offer ideas for the definition of potential guidelines and regulations (or parts of them) for the development plans of these inhabited centers, also focused on the architectural and human scale, to promote more sustainable development and meet the needs of the communities. Encouraging public investments and services in these structures can also incentivize sustainable development. The beneficiaries should primarily be the residents of the informal settlements themselves. They are the ones who are most affected by the challenges. Research on that topic should aim to empower and include the residents in the planning and decision-making processes so that they can play an active role in shaping their communities and improving their living conditions. In addition, the wider public and international community could also gain a better understanding of the complex issues surrounding Natural Cities. Other potential beneficiaries could include local governments, non-governmental organisations (NGOs), academic institutions, and other stakeholders involved in urban development.

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