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SUSTAINABLE PLACES FOR FUTURE CITIES. WASTE AND RECYCLING AS SUBSTANTIAL PART OF THE DESIGN PROCESSES OF A WELL-BEING ARCHITECTURE

ZRÓWNOWAŻONE MIEJSCA DLA MIAST PRZYSZŁOŚCI. ODPADY I RECYKLING JAKO ISTOTNA CZĘŚĆ PROCESÓW PROJEKTOWANIA ARCHITEKTURY DOBROBYTU

Abstract

Even though the concept of sustainable architecture was born about 50 years ago, governments have still not managed to solve the serious environmental problems that are compromising the survival of the Earth while most communities still retain their old habits of passive consumers of goods that are not always recyclable. Using the example of best practices and waste-made architectures, this contribution highlights some fundamental issues regarding a way of designing sustainable architecture and cities.

Keywords: sustainability, well-being, waste, recycling, best practice

Streszczenie

Choć koncepcja zrównoważonej architektury narodziła się około 50 lat temu, rządzącym wciąż nie udało się rozwiązać poważnych problemów środowiskowych, które zagrażają przetrwaniu Ziemi, a większość społeczności nadal zachowuje swoje stare nawyki biernych konsumentów towarów, które nie zawsze nadają się do recyklingu. Bazując na przykładach najlepszych praktyk i obiektów architektonicznych powstałych z wykorzystaniem surowców wtórnych, niniejszy artykuł zwraca uwagę na kilka fundamentalnych kwestii dotyczących sposobu projektowania zrównoważonej architektury i miast.

Słowa kluczowe: zrównoważony rozwój, dobre samopoczucie, odpady, recykling, najlepsze praktyki

1. INTRODUCTION

Carbon emissions fill the air, particulate matter floats inside our lungs while electromagnetic radiation envelops the earth. Yet, a different epoch is possible, an Aerocene epoch – one of interplanetary sensitivity through a new ecology of practice. Ecosystems have to be thought of as webs of interactions, within which each living being's ecology co-evolves. By focusing less on individuals and more on reciprocal relationships, we might think beyond what means are necessary to control our environments and more on the shared formation of our quotidian. Let the spiderweb guide here.

Tomás Saraceno[1]

Last June 2021, Tomás Saraceno's walk-in installation *In orbit* (Ill. 1) was reopened, located approximately 25 meters above the K21 square of the Kunstsammlung Nordrhein-Westfalen in Düsseldorf. It is made up of walkable steel networks that extend over three levels under the museum's enormous glass dome. The installation looks like a surreal landscape, a sea of clouds or space with its weightless planets.

Tomás Saraceno's research combines art, natural and social sciences, inviting us to change our point of view on reality and to connect with natural elements such as dust, spiders or plants that become protagonists of his installations and metaphors of the cosmos.

Ill. 1. *In orbit*, Tomás Saraceno, Düsseldorf, 2013. Photo by Fabian Møller (2017), https://unsplash.com/s/photos/tom%C3%A1s-saraceno (access: 08.2023).

[1] T. Saraceno: Aria [in:] Tanya Bonakdar Gallery, https://www.tanyabonakdargallery.com/exhibitions/388-tomas-saraceno-aria-palazzo-strozzi-florence-italy/ (access: 08.2023).

> The creative action and ways of thinking art in Tomás Saraceno (Argentina, 1973) develop dialogues and research exchanges in several areas of knowledge with unexpectedly fruitful results, allowing a broad reflection on art and research. The transdisciplinary artistic projects of this author seek solutions for a more sustainable planet[2].

Tomás Saraceno's way of conceiving space offers a profound reflection that can also involve the field of architecture, because his installations take on meaning only when they are inhabited by people and are not understandable without the presence of the human being. According to Saraceno, space is a sort of negotiation between people, something to share, invented and reinvented continuously by the way in which people relate and interact with each other. Space itself is indefinite while collaboration between people can create it.

Tomás Saraceno expresses an artistic creation without conceptual, technological or aesthetic limits. His path, choices and thoughts highlight art as research and the author as a scientific binomial. The experiences provided by the installations return intense sensory attunements and generate emotions that can be connected to terms such as "strange", "absurd" or "magical". For the visitor, these new conditions can become an engine of liberation from preconceptions and prejudices about spaces, the body and how to inhabit them. Overcoming dogmas, or simply providing unexpected solutions on how to design a future sustainable coexistence, Saraceno creates dialogues with the "other", bridges towards possible rhizomatic systems of sustainability previously unsuspected. Drawing yet another chance of survival, through the example of the strange and robust structural lightness of the net, he tries to reinvent the city as a collective, self-sufficient structure, where life can subsist without further damage to nature. Sustainability is a process that cuts across all areas of human life and is fundamentally an individual awareness of the collective being, which everyone must acquire by combining the parts with the whole. That is, the part that each of us represents in the interest of a collective that goes beyond the group and penetrates in respect of the universal values of all species and of the planet itself. These should be the prerequisites of creatives facing the problems posed by the Anthropocene era in which we were born[3].

Urban and social issues, still relevant, are intertwined in the project *Taking Care Designing for the Common Good*, exhibited in the Padiglione Italia at the 2016 Biennale Architettura, where an architecture was proposed at the service of a community, able of taking care of individuals and places, against marginality and exclusion. An architecture that could claim rights, progress, opportunities and inclusion of the many suburbs of living. The project

> aims to create a virtuous process that, through participatory, intelligent, creative and effective architecture, disrupts the status quo and transforms marginal landscapes into places of socialization, exchange and sharing. […] The investment is therefore being made in public space, in ways that will educate and unite, incorporate differences, and help unify social, functional and spatial diversity, which has to be understood as a value[4].

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[2] R. Dora-Iva, *Tomás Saraceno: o Pós-Antropoceno*, "Revista CROMA. Estudos Artísticos" 2017, vol. 5, no. 10, p. 116.

[3] *Ibidem,* p. 125.

[4] F. Galloni [in:] Lepore, M., Pantaleo, R., Sfriso, S. (eds.), *TAKING CARE. Progettare per il bene comune / Designing for the common good, Padiglione Italia, Biennale Architettura 2016*, BeccoGiallo, Padova 2016, p. 13.

> This idea of architecture does not promise a new theory. Rather it is constructed as a complex practice conducted through cooperation with the numerous socio-cultural organisations active in various outer city areas. In this complex and often disaggregated setting, architecture has to reconstruct its own role as a common understanding appropriately disseminated and shared, capable of caring for places and developing human capital in every community[5].

Going even further back in time, in 1962, the unusual success of the book *Anonymous (20th Century)* written by Leonardo Ricci, is symptomatic of a widespread need of architectural culture in the Sixties. The combination of modern forms and ancient or reactionary contents, realized by the neo-capitalism of the time, undermines the certainties and values that had been consolidated in the years between 1920 and 1940. Hence the drive to demystify and re-propose from scratch the question of living, and the growing appreciation of Ricci's existential position.

In his incessant aspiration for a new, harmonious and just world, destined for new people, reconciled with their fellows and with nature (Ill. 2), Ricci reveals the utopian foundation of his ideas. He recognizes in himself the figure of a utopian, scientific and radical architect with the aim of experimenting with alternative values that favour new integrated systems of social, existential, spatial and functional relationships.

According to various manifestations and interpretations, this attention to the complex relationship between people and environment marks the research and artistic and architectural productions of many exponents of contemporary culture in recent decades. The issues raised by the environmental and climate crisis now pervade all disciplinary fields, requiring us to continuously observe the relationship between people/architecture/city.

The progressive expansion of the metropolis and the consumption of land have led to an alarming increase in areas contaminated by the presence of waste, bringing the need to identify effective solutions for the action of "discarding" which can be roughly divided into waste destined for abandonment and waste aimed at reuse. We know that waste follows three paths: abandonment in landfill areas, destruction through energy valorisation practices, the implementation of various recycling techniques for the subsequent reintroduction of waste within a life cycle, linked to production and daily living. The crisis currently affecting the field of waste and its disposal requires a critical reflection on the contribution that architectural culture can offer to the protection of the anthropic environment[6].

In 2017, the two Italian ministries of the Ministries of the Environment and Economy published a document on the circular economy for Italy, underlining that technological and environmental innovations, eco-design, product labelling, green procurement, environmental certifications, analysis of environmental performance of products, traceability along the life cycle, must therefore be developed together with organisational, social and cultural innovations, shared social responsibility of companies, protection of work and rights, in order to guarantee on the one hand the competitiveness of companies on national and international markets, on the other hand, reducing environmental impacts and promoting social cohesion by allowing accessibility to quality goods and services for all, guaranteeing adequate levels

[5] M. Lepore, R. Pantaleo, S. Sfriso (eds.), *TAKING CARE. Progettare per il bene comune / Designing for the common good, Padiglione Italia, Biennale Architettura 2016*, BeccoGiallo, Padova 2016, pp. 30–31.

[6] See: S. Bigiotti, *L'architettura degli scarti. Teorie e pratiche per la progettazione sostenibile dei centri di riciclo e riuso*, ARe, Roma 2021, pp. 21–22, 31.

of general "well-being" no longer based and measured on the quantity of goods owned and consumed[7].

Ill. 2. Primary School in Monte degli Ulivi, Riesi (CL), Leonardo Ricci, 1963–1967. Source: Own work. Photo by Emanuele Piccardo (2019). Creative Commons https://commons.wikimedia.org/wiki/File:Monte_degli_Ulivi_balcone.jpg (access: 08.2023).

Particular attention is therefore paid to the creation of new links between technological and social innovations, encouraging a "well-being" that is no longer based on the "quantity of goods owned and consumed", hence the need for a substantial change in the way of thinking of individuals and their relationship with the consumption of products.

In the *World Cities 2016* report by UnHabitat, which refers to five key principles to guide the development of the city in the near future, the need to provide tools for the empowerment of citizens through participatory and collaborative processes is indicated. In this scenario it is necessary to reinterpret the behaviour of the individual which no longer corresponds to the *homo economicus* model, guided by the search for profit maximization, but rather to a model focused on the sense of responsibility and commitment towards the community. In fact,

[7] See: Ministero dell'Ambiente, Ministero dello Sviluppo Economico, *Verso un modello di economia circolare per l'Italia. Documento di inquadramento e di posizionamento strategico*, 2017, https://circulareconomy.europa.eu/platform/sites/default/files/national_strategy_for_circular_economy_11_2017_it1.pdf (access: 08.2023), p. 46.

we must move from a model based on the principle of rationality to one focused on relationships, made up of reciprocity and responsibility towards the material[8].

2. EXAMPLES OF BEST PRACTICE

Since the above concepts some examples are given highlighting their quality and potential.

Created in Madrid (2004–2007) by *ecosistema urbano*, the *Eco-boulevard* (Ill. 3 and 4) in Vallecas constitutes a successful example of an architectural system with a technical function capable of responding to the needs of a community. Although the monumental image of a dystopian machine might actually recall the imagery of the film *Metropolis* (by Fritz Lang, 1927) the use that the community has made of this particular space confirms the achievement of the project's objective. From the authors' description: it is an ecological boulevard for a social and bioclimatically conditioned public space. Co-funded by the European Union (LIFE-2002) and the EMVS, the Eco-boulevard can be defined as an urban recycling operation consisting of the following actions: insertion of an air tree-social dynamizer over an existing urbanization area, densification of existing trees and reduction with asymmetric arrangement of wheeled traffic circulation. There are two main objectives: one of a social nature aimed to generating activity, and one of an environmental nature, the bioclimatic adaptation of outdoor space, achieved with a system of passive air conditioning based on chilling by evapotranspiration. This system, commonly used in the green house industry, is capable of lowering temperature by approximately 10 degrees centigrade, depending on humidity conditions and temperature. The system goes into action when a temperature sensor detects values above 27 degrees in the surrounding environment. It is particularly effective with high temperatures and low relative humidity (typical conditions in Madrid during the summer). This sort of artificial trees, *Air Trees*, are exportable objects and can be re-installed in similar locations or in other types of situations that require an urban activity or reactivation[9].

The founders of *ecosistema urbano* (Madrid and Miami), a design and consulting company operating within the fields of urbanism, architecture, engineering and sociology, define their approach as urban social design, conceiving the design of environments and spaces for improving self-organization of citizens, social interaction within communities and their relationship with the environment. Their latest projects include the Banyan Hub, a mixed-used bioclimatic building in West Palm Beach (US), a new interactive public space for Malaga University Campus (Spain), an upgrading project for Dhaka neighbourhoods (Bangladesh) and a landscape revitalization project for Hermosillo Historical Centre (Mexico). Urban Ecosystem manages a digital platform with online channels around the subject of creative urban sustainability and develops social software, exploring the new possibilities technology offered to empower people and improve social connectivity and interaction[10].

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[8] See: S. Massaro, *Ripensare gli spazi della filiera del recupero* [in:] S. Bigiotti, *L'architettura degli scarti. Teorie e pratiche per la progettazione sostenibile dei centri di riciclo e riuso*, ARe, Roma 2021, pp. 103–104.

[9] See: ECO-BOULEVARD [in:] ecosistema urbano, https://ecosistemaurbano.com/eco-boulevard/ (access: 08.2023).

[10] About us [in:] ecosistema urbano, https://ecosistemaurbano.com/eco-boulevard/ (access: 08.2023).

Ill. 3. Playground under an *Air Tree* in the Eco-boulevard Vallecas, Madrid, 2004–2007. Source: Own work, Creative Commons. Photo by Zarateman (2015). https://commons.wikimedia.org/wiki/File:El_Ensanche_de_Vallecas_contar%C3%A1_con_cuatro_nuevos_parques_infantiles_inspirados_en_mundos_de_fantas%C3%ADa_01.jpg (access: 08.2023).

Ill. 4. Playground under an *Air Tree* in the Eco-boulevard Vallecas, Madrid, 2004–2007. Source: Diario de Madrid – El Ensanche de Vallecas contará con cuatro nuevos parques infantiles inspirados en mundos de fantasía Creative Commons. Photo by Diario de Madrid (2018). https://commons.wikimedia.org/wiki/File:El_Ensanche_de_Vallecas_contar%C3%A1_con_cuatro_nuevos_parques_infantiles_inspirados_en_mundos_de_fantas%C3%ADa_01.jpg (access: 08.2023).

Architecture here is a pretext for reconciling design with the needs of the community, embracing the complexity of the production process of an architectural work with these purposes. For example, the Ecópolis Plaza project, created for the Municipality of Rivas Vaciamadrid (2009–2010), contains in the program an energy efficient kindergarten, a play space for children, and a new public space, and is conceived as a source of learning for citizens, educating on energy saving and optimization of natural resources. The project integrates ecology in everyday life, without turning it into an exceptional phenomenon more similar to a theme park or museum. In this project, the architecture goes beyond formal experimentation, to transform a vacant lot on the outskirts of Madrid into a space for social interaction. The solution combines passive energy saving systems together with active systems, and the waste water from the building is naturally purified by a macrophyte lagoon incorporated in the public space. This recycled water is stored under the ground within a gravel tank and then used for all the irrigation needs of the garden. This artificial landscape emulates a natural riverbank and the surrounding topography creates an enclosure and buffer area protecting the building and users from the surrounding aggressive industrial environment. The project has received several awards, including the Best Practices from the UN-Habitat.

3. WASTE ARCHITECTURE

On the use of waste in architecture, the research of architect Tiziana Monterisi is exemplary and constitutes one of the many virtuous cases of recycling materials coming from the agricultural production cycle (Ill. 5). She is the founder of the "Coltivare la città" firm and created the Rice House construction method using waste from rice production in Italy. In the province of Vercelli approximately 70,000 hectares are cultivated with rice, producing 50 quintals per hectare of rice straw per year, from which 250 bales could be obtained, per hectare, of approximately 20 kilograms each, thus obtaining 17,500,000 bales per hectare in a year. Rice House has calculated that two bales of straw are needed to build one square meter of wall, so, based on the annual production of agricultural waste described above, each year there could be 8,750,000 square meters of wall built with straw bales, at very low costs because they are generated from waste that farmers must dispose of. The high energy performance of straw allows the building made with this material to be classified as a passive building. Operating costs for cooling and heating are reduced, resulting in enormous economic savings. Further savings are achieved thanks to the prefabrication of the construction elements and reduced construction times. These are some of the principles of Rice House:

> using natural or recycled materials; considering, in a sustainable way, the entire life cycle of the individual element and the entire building, in order to extremely reduce the environmental and social impact; using preferably local materials, with the active and proactive involvement of local businesses; providing for minimal consumption of energy and raw materials; improving the quality of life of the inhabitants; satisfying strictly physical and psychophysical well-being needs, while respecting a new social responsibility[11].

[11] See: Rice House, https://www.ricehouse.it/ (access: 08.2023).

Ill. 5. House of straw and mud in Sieben Linden, 1997. Source: Own work, Creative Commons. Photo by Marcos-molz (2008). https://commons.wikimedia.org/wiki/File:Casa_de_palha_e_barro.JPG (access: 08.2023).

It is interesting to point out that Tiziana Monterisi started her business by simply observing from her own home the production cycles in the nearby farms and wondering if all that waste material could have some use for architecture. This confirms that any sustainability process must still pass through the motivation of the single individual, who must be encouraged to look around to observe all the possible opportunities for improving his own living conditions, being aware that environmental well-being will not be achieved only through the marketing of numerous products of the new contemporary industrial market. All industrial production, aimed at solving environmental problems, must be part of a very complex process where the user must be a conscious protagonist and not a passive consumer of new products, the application of which, although very useful, is not enough to face the huge and numerous series of environmental emergencies.

Forming an aware society can stem the production of waste and, at the same time, activate regeneration and reuse policies. On the other hand, waste sites are still seen as confined areas of the city (see the term ecological "islands"), and we wonder whether these parts of the city cannot in some way communicate with the urban fabric, being derived by society itself and belonging to the cycle of urban life and the processes of living. If we start from the assumption that recovery and reuse in the city can contemplate different scales of action, from materials, to buildings, to entire neighbourhoods, we hope that recycling centres can be the physical spaces where this regeneration process takes place. Rather than physically representing the city's waste, these centres can be rehabilitated on an urban level by conceiving places of contact within them, with permeable walls between the reuse activities and the community. They could therefore also contain spaces for learning about recycling processes, places for dialogue and information on recycling, educational workshops on saving, for creative reuse, etc[12].

4. CONCLUSION

Scientists and professionals have been studying the various issues for decades and, as Werner Sobek states, the question to ask is not "how have we worked and lived until now?" but "how should we work and live in the future?". The answer to this second question requires the mental effort necessary to unconditionally anticipate what the future holds. Although this method may occasionally lead us to an impractical solution, it is the only approach that can allow us to intellectually justify our work. The architecture of today and tomorrow must be radically different from the previous one. It can achieve this by adopting a positive attitude towards the natural environment and its inhabitants and by enhancing environmentally sustainable technologies.

For decades we have known that we will mostly leave rubbish to posterity, as we are reminded by the works of the German artist Ha Schult who created and placed Trash People (Ill. 6) in various cities around the world.

The installation recalls the terracotta army present in the mausoleum of Xi'an, China, but instead of ceramic, the thousand sculptures that make up the majestic installation were created with old cans, plastic and bottles, detergent containers, rusty cans, car parts, bodywork and computers. The installation offers the possibility of relaunching a severe and important warning through art (explains Fabio Di Gioia, Italian curator of the event) that of the Trash People is a cheerful and at the same time disturbing presence, because it reminds us that the most magic of the planet have all been reached by human pollution. The garbage men have already landed in Piazza del Popolo in Rome, at the Pyramids of Giza, in Red Square in Moscow, at La Defense in Paris and at the Great Wall[13].

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[12] See: A. Fiorelli, *I luoghi degli scarti. Spazi isolati o inclusivi?* [in:] S. Bigiotti, *L'architettura degli scarti. Teorie e pratiche per la progettazione sostenibile dei centri di riciclo e riuso*, ARe, Roma 2021, pp. 71, 73.

[13] See: G. Totorizzo, *Arte, a Matera arriva l'esercito dei Trash people: "Uomini spazzatura contro l'inquinamento"*, "la Repubblica", 26.08.2019, https://bari.repubblica.it/cronaca/2019/08/26/foto/arte_trash_people_matera-234372606/1/ (access: 08.2023).

Ill. 6. *Trash People* by Ha Schult, Piazza del Popolo, Roma, 2007. Source: Trash People @ Rome 1, Creative Commons. Photo by Roberto Ventre (2007). https://commons.wikimedia.org/wiki/File:Trash_People_@_Rome_1_-_Flickr_-_Roberto_Ventre.jpg (access: 08.2023).

If it is true that industrial products are "banks of resources", as Thomas Rau[14] states, and that the accumulation of waste and post-consumer goods should be considered "repositories", we can consider waste among the main resources of the city of the 21st century. Many contemporary European projects demonstrate how the spaces and equipment of the recovery chain increasingly tend to be less detached from the context and to integrate into the urban fabric, according to adaptive strategies that aim to contain land consumption and the reuse of urban voids and existing buildings, so the project becomes an opportunity for a reconnection of flows and for the activation of cycles. In the idea of a circular society, promoted by the European Union, based on reuse and recycling, some verbs such as select, disassemble, exchange, deposit, confer, transform, disassemble, reassemble, will become increasingly familiar[15].

This contribution concludes by reporting the thoughts that Richard Neutra wrote in 1954 on his work as a designer: through the daily experience of designing projects for construction and manufacturing, and through an increasingly urgent need to interpret them in a convincing way for users, he has gradually come to adopt a friendly, attentive, physiological attitude in design, and to forget the more speculative terms. The architect, like any other artist, can never demonstrate things, strictly speaking, they must slowly prove themselves to others[16].

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