ARCHITECTURAL SUSTAINABILITY – A NEW INSPIRATION

A B S T R A C T

Sustainable building, use of local materials, responsible use of soils, re-use, adaptability to climate, are all concepts that became worldwide part of the vocabulary of contemporary architectural design since the energy expenditure in the construction sector has proved to be of such magnitude to be unsustainable in the medium and long term.

Yet these are the basic concepts that have always been considered as being of vital importance in vernacular and spontaneous building throughout the world. The great variety of shapes, typologies and materials used were always the optimal response to local social-, weather-, religious conditions and example of essential and efficient use of resources. Buildings were, throughout history, mostly set according to three basic principles: climatic-environmental, socio-cultural and socio-economic. The specific local variations of each of the three principles have generated buildings able to fully respond to the identified needs.

This contribution aims to highlight how the lessons taught by vernacular architecture can inspire contemporary architecture and how a reinterpretation of the vernacular heritage can become our challenge for the future.

KEY WORDS

VERNACULAR ARCHITECTURE
SUSTAINABLE ARCHITECTURE
TRADITIONAL ARCHITECTURE

INTRODUCTION

Most academies have become aware of the value of the knowledge condensed in what remains of cultures that have mostly disappeared.¹

Materials and techniques used in popular/vernacular building since the beginning of construction prove to be a fundamental source of good practices and examples investing different sectors/issues as architectural and structural design, climate control, building technology and energy use reduction, among others.

At the same time, vernacular architecture represents a tangible response to environmental and climatic constraints, as well as to the socio-economic and cultural characters of society.

What does *vernacular* mean?

According to several definitions vernacular, traditional or popular architecture, “architecture without architects”, is opposed to scholarly architecture² and conceived directly by common people.³ In some more in-depth definitions “vernacular kind” means everything that was crafted, woven or reared at home and not for sale, but for domestic use⁴ and emerging from the *Genius Loci* or, better, encapsulating the sense of the *being of the place* and the *being to the place*.⁵

Read together, all these definitions identify a way of building that’s very respectful for both the mankind and the surrounding environment, reaching almost always and everywhere the best possible comfort and functionality.

Moreover, vernacular architecture is the result of an ancestral knowledge, that bended construction to social needs, adapted it to local climate and geography, political and religious conditions. This makes it appear, at a more attentive glance, both ordinary (because “popular”) and extra-ordinary because of the many issues involved: social, cultural, geographic, anthropological, and not only architectural.⁶

Three pillars have been recently identified to define vernacular architecture,⁷ and they are related to nature and environment, socio-cultural issues, socio-economical issues. These three pillars represent the solid basement on which mankind has relied to construct buildings and urban environments that were at the same time safe, comfortable, durable, affordable, beautiful and socially accepted. Missing just one of the three pillars, the building action was bound to not work, or even fail.

The principles that determined vernacular building have been definitely put aside during the industrial building boom, in the post-war decades, and practically forgotten for many years. Technology supplied all needs, favoring unsystematic constructive solutions that got indiscriminately applied in different contexts; often without taking into any account the specific local conditions and materials.

Moreover, the demand on building quality has become more and more focused just on its mechanical resistance and durability, ever less on other issues as health, energy consumption, social acceptance, etc.

The result has been that, despite the recognized values joined to vernacular building practices, a diffused tendency to replace common sense with a more or less “sustainable” globalization, has characterized the architectural design of this past century.

What does *sustainable* mean?

Following the energy crisis of the ‘70s, in times of gain of consciousness towards new needs of a more contained and intelligent use of energy, of the wish to contain pollution and optimize natural resources, of the desire to regain a more human dimension of the space, things are changing and the word *sustainable* has assumed a new appeal and also a new significance.

Finally, starting in 1987 the expression *environmental sustainability* has acquired worldspread significance thanks to the Bruntland Commission Report *Our Common Future*, and has inspired most succeeding actions of definition of strategies and policies related mostly to environmental issues (Rio de Janeiro 1992, Kyoto 1997, Copenhagen 2009, etc.).

The word *sustainable* is used today to designate a type of architecture or construction that opposes the technological architecture before mentioned. But there is an incredible confusion even on the terminology, as *sustainable* is often casually confused or replaced with terms like “ecological”, “natural”, “green”, “bioclimatic”, “bio”, “passive”.

Starting with the Km0 concept, it originated in other fields of interest, namely the food sector, which has been transferred to architecture. The general demand for an increasing healthy production and slow consumption (the basic principle of the *slow food*), opposed to the hegemony of the use-and-throw and fast consuming, leads to the promotion of local products that are not transported. Similarly, Km0 restoration endorses the repair, consolidation or reinforcement

of the building with local materials, techniques and crafts. This avoids transportation and commuting, which favors local economies and reduces the ecological impact of the work by decreasing CO₂ production and favoring the adaptation of the material to its location.

The term *bioclimatic* introduces to concepts like passive architecture or connects almost exclusively to renewable energy issues (solar-, geothermic-, wind energy), while bio-architecture/construction underlines the biological aspect related to both the building and the occupants.

Another consideration has to be made about the meaning given to ecological or green building/architecture/design. This introduces a more complex concept that involves awareness on the carbon footprint of the action of building itself, on the building lifecycle assessment, on the general impact that the building action has on the environment.

Recycling has in this matter a privileged consideration, that includes in the first place the recycling or reusing of old buildings and materials *tout court*, and adds the application of principles and techniques of the past.

In a few words, a general new attraction towards low-tech architecture, giving importance to environment, human health and climatic issues has arisen and has been generically defined as *sustainable*.

In reality the word *sustainable* should include all the issues together, to be really meant as such, and not just a part of them. A house built with wood may be natural, but is not sustainable as long as the wood does not grow in the surrounding, the local crafts are not able to work it with proficiency and the climate does not guarantee its durability, and so on.

Figure 1. Village in Provence, France
(credits: M. Achenza)

Figure 2. Village in the area of Petra, Jordan
(credits: M. Achenza)

VERNACULAR METHODS AND STRATEGIES

Vernacular architecture and its methods and strategies are seldom applied in recent building trends in the western countries, despite the fact that they have given repair and protection to the human kind for millennia. These strategies and solutions have been ordered and partly systematized with the *VERSUS project. Lessons learned from the vernacular heritage* through 3 pillars that can be declined in 15 principles. The three pillars are the environmental, the socio-economic and the socio-cultural sustainability in architecture.

Referring to the existing research on vernacular architecture, the Versus research project states that **environmental sustainability** interprets human habitat and architecture as a dynamic system able to adapt itself to continuous environmental changes. And this goal is achieved by respecting nature using natural, renewable, recyclable and organic materials, by integrating the building into the environment not harming other elements of the ecosystem, by appropriately situating the building in order to take advantage from the site's bioclimatic features (solar radiation, wind, orientation, etc), by reducing pollution and waste materials and applying solutions to mitigate the effects of natural hazards. This translates into buildings which are not just using the local materials in their best performing asset, but also are including a typology, morphology, a height, wall thickness, opening sizes, water channels, connections, heating/cooling systems that all together contribute to the best functioning of the system in the most attentive respect to the environment.

Socio-cultural sustainability encourages us to re-establish the anthropological and social dimension of our habitats. A connected, non-arrogant, peaceful, human-scale architecture that fits into sites, topographies, mineral and vegetal environments.⁸

Vernacular architecture embodies tangible as well as intangible knowledge that testify the genial capacity of adaptation of the human being to the most adverse environmental conditions. Socio-cultural sustainability addresses the capacity of modeling nature through agriculture and production, thinking about wine yards or salt marshes, but also the capacity of transforming local resources, (stone, earth, wood, plants) into building elements and objects (houses, stables, laboratories) that adapt to the place, meets their needs and addresses the social and the cultural identity of the specific territories. Collective memory and intelligence, creativity, desire and capacity to exchange and live together to preserve local identity and maintain the conditions of social cohesion are the engine driving these actions.

Socio-economical sustainability meets the needs of a community to be more self-sufficient by sustaining local production, by optimizing local materials and by choosing to work with communal efforts. The efficient management of the local resources becomes then the main goal of any community, and gets particularly concentrating the more the resource is scarce, i.e. when it concerns water or wood in arid environments.

Collective intelligence and creativity produced ingenious solutions even in extreme conditions, sustainable in the long term and providing comfort and safety to its inhabitants.

Architecture nowadays seems to have relied just on very few technologies and building processes, careless of the surrounding landscapes and local cultures, attentive just to resolving the function and the durability.

The abovementioned pillars can get declined in 15 strategies that can involve the urban-, territorial-, architectural- and technical/constructive dimension.

For each pillar, 5 main goals to be achieved were considered as fundamental:

1. For the environmental sustainability:

- to respect nature, the environmental context and the landscape. This has been a pregnant issue in organic architecture, from Frank Lloyd Wright and his Fallingwater (1939) to Tom Aberts and his project of the ING Head Office in Amsterdam (Amsterdamse Poort, 1983), researching the way to better integrate buildings in nature, using natural materials in organic forms in a continuous attempt to join landscape and human interaction, and being attentive to a limited soil consumption;
- to benefit from natural and climatic resources, taking advantage from local particular climatic conditions, such as ventilation, solar radiation, natural slopes, orientation, presence of water, etc.;
- to reduce pollution and waste materials, which allows at the same time reducing the impact on the environment. It means to be careful in not determining excess by producing building components, or be able to re-use it. It means also to re-collocate building elements once dismissed, so not to be forced to spend more energy in order to re-put them in nature;
- to mitigate natural and human hazard effect, a very sensible issue, that challenged designers throughout history to assure safety dwellings. Earthquakes, hurricanes, floods, but also wars and medical emergencies have stimulated creative building solutions in all corners of the planet.

For the socio-cultural sustainability:

- to protect cultural landscape, meaning to claim the value of the natural landscape and defend it from architectural projects alien to the context;
- to transfer building cultures, keeping alive local traditions and *savoir-faire* as carriers of cultural identity and knowledge;
- to enhance innovative and creative solutions, that brought to give distinctive signs and decorations to towns and buildings;
- to recognize intangible values that have been the reason for the creation of certain sites or buildings, more often joined to religious purposes rather than political. It's the case of the recent 9/11 Memorial Museum in New York (M. Arad and P. Walker 2011), bearing a special interest not for the construction itself as much as for the memory carried in it;
- to encourage social cohesion, by creating urban spaces which become place for social interaction. In the past these spaces were represented by squares, colonnades, fountains, public ovens, wash houses, granaries. Nowadays, in more congested urban environments, these spaces are represented rather by pedestrian zones, parks, equipped pathways.

2. For the socio-economic sustainability:

- to support autonomy, giving the chance to inhabitants to cope with their local material and resources, without forcing them to rely on external contributions that could lead, in the medium and long term, to a non sustainable dependency;
- to promote local activities, by enhancing short circuits and local trades (Km0 principle), promoting the common use of space (spaces for co-working and co-housing), defending the local production of handicraft goods;
- to optimize construction efforts by assuring an appropriate scale of the building, using sufficiently simple building processes and reducing transportation efforts.

These strategies, involving the three macro-areas, influence the building process at different scale: 1) urban and local-, 2) architectural- and 3) constructive/technical scale, giving a multitude of skilled solutions that represent today the rich built historical heritage of our planet.

At urban scale it starts with the definition of new settlements, as they had to put together many issues related not just to geography, morphology, access to water resources, climate constraint, but also guarantee the easiness of access and defense, the availability of food and goods, stimulate the skills of local citizens

to prepare and mount together building elements, and, more, their capability to organize the settlement as a complex organism where public and private spaces are integrated and well accepted by the community.

In such context for example communities organized the urban landscapes in a scarce or dense form, and planned collective spaces to meet or to work, or share common activities for leisure or productive purposes. Squares and loggias, gardens and parks, but also public ovens to bake bread and fountains, wash houses and dye areas, to name some.

At architectural scale solutions vary in a great difference according to culture and geographical area. The starting point is often the local availability of building material which determines a sequence of other choices about the typology of the building, its morphology, the indoor climate control systems (for passive ventilation and solar gain), the integration of in-between and buffer spaces. This all translates in the choice between compact or courtyard houses, with flat or pitched roofs, with or without external shading, with different systems aiming to cool or heat after the local climatic needs.

Technical and constructive strategies and solutions have been almost always related to locally available materials and their adapted applications. The building envelope needed to respond at the same time to many different issues concerning stability, durability and energetic performance. High thermal inertia walls built with earth or stone have been chosen to guarantee the accumulation of heat or cool, while lightweight structures have been rather used in humid and very warm sites. A great variety of technical solutions are registered to cope with earthquakes and flooding, hurricanes and extreme temperatures and involve the use of wooden frames and walls thickening and shaping, the introduction of shading systems as *louvres* and blinds, under floor heating or water cooling.

Figure 3. Chinchero, Peru
(credits: M. Achenza)

Figure 4. Orgosolo, Italy
(credits: Wikimedia Commons)

Most of these solutions represent today a priceless cultural heritage that can be easily transferred to contemporary architectural design in order to solve new upcoming issues that get generically translated into the need of a more *sustainable* way of conceiving architecture.

CONTEMPORARY SUSTAINABLE ARCHITECTURE

So, how can contemporary sustainable architecture retake the lessons coming from the past and adapt it to current needs?

Architecture has followed during the past century a path that took into consideration, in some cases, vernacular principles and exploited them to fulfill actual needs. The organic movement, starting with Frank Lloyd Wright and Alvar Aalto, followed later on by other professionals as Paolo Soleri in the US and the Italian Association for Organic Architecture (Bruno Zevi, Luigi Piccinato, Mario Ridolfi, Pierluigi Nervi and others) has expressed into form for almost a century the need to relate architecture to nature. There's left many beautiful examples of these currents, Casa Malaparte (Adalberto Libera, 1937) and the Olivetti factory in Pozzuoli (Luigi Cosenza, 1955). Luigi Cosenza's studies of the Phlegraean islands⁹, made together with Bernard Rudowsky, profoundly inspired his work throughout his all professional life, for public, productive and private buildings. The adaptation to the landscape, the use of compact forms recalling the traditional cube, the use of local materials, are clearly the fundament of important projects for private houses and productive spaces. For The Olivetti factory Cosenza sought the best exposition to sun choosing accordingly spaces for production and for resting. He alternated wisely green courts to work spaces. The control of light diffusion was guaranteed by a roof converging to the center of the building, filtered through metallic adjustable shades. According to the local tradition he developed an interesting rainwater collection system through cave pillars. These are all practices well consolidated in historical vernacular architecture, which got successfully reinterpreted for contemporary use.

Later on, until today, many more architects challenged themselves on the same issues producing excellent interpretations of the vernacular teaching we inherited from the past.

Fabrizio Carola, an Italian architect that built in 1984 Mauritania the Kaedi Regional Hospital, for which he received in 1995 the Aga Khan Award for Architecture. In this project his attention focused on the establishment of a symbiotic relationship between matter and place.

Earth and fired bricks allowed him to create works for which the use of wood was firmly avoided to reduce the steady desertification of the territory as well as the refuse for the use of iron and concrete elements, alien and therefore inappropriate to the context.

The result is a beautiful complex of little buildings organized in a floral shaped architectural plan that reminds local villages, where sick people can be assisted directly by the family, following the local habits. All sorts of attention have been given to assure the best climate control in all areas by using covered passages and natural ventilation.

Another project from the German architects Anna Heringer and Eike Roswag in Bangladesh was conceived with a similar approach. The METI School was constructed in 2005-6 in Rudrapur using local materials (earth and bamboo) and technologies, as part of a more structured program that aimed to give the rural population new perspectives strengthening their sense of identity. Also this project received the Aga Khan Award in 2009.

A recent example of sustainable residential building in a dense urban area can be represented by the Vertical Forest designed by Boeri Studio. The project, regarding two residential towers of 110 and 76 m height, is located in the centre of Milan, hosting 900 trees and over 2000 plants. The choice of the designer moves in the direction of no further territory consumption and, on the contrary, works towards a vertical densification of nature within the city, helping the surrounding microclimate with oxygen and humidity production, absorption of CO₂ and dust particles.

Figure 5. The Highline, New York, USA
(credits: M. Achenza)

Figure 6. Wash house in Sardara, Italy
(credits: M. Achenza)

CONCLUSIONS

In described projects designers operated a critical view opposing the diffused attitude of focusing architecture just on the mechanical aspects of materials used, their durability, and in more recent years, their energetic performance. They also oppose the common believe that buildings can be sustainable if they fulfill even just one of the conditions indicated by the three pillars of sustainability, respectful of either natural or social or economical issues.

But we cannot consider sustainable a building that has a very high energetic performance if it has been built with materials that have been produced with a high amount of energy. We cannot consider sustainable a building, even if made of natural materials, if these have been transported from the other end of the planet. We cannot consider sustainable a building practice fully imported from industrialized countries if the beneficiary people do not recognize it as its own, and abandon it.

Sustainability has to be reconsidered as we did once: an exercise of common sense that puts the human being in balance between vital needs and cohesion with nature, more and more free from depending on technology and fossil fuels. For this, vernacular architecture can be still an extraordinary teacher.

NOTES

- 1 Frey, P. "New vernacular architecture vs. sustainable development?," in: Correia, M., Dipasquale, L., Mecca, S. (eds.) *Versus: heritage for tomorrow*. (Firenze: Firenze University Press, 2014).
- 2 Rudofsky, B. *Architecture Without Architects: A Short Introduction to Non-pedigreed Architecture*. (New York UNM Press, The Museum of Modern Arts, 1964).
- 3 Oliver, P. *Dwellings: The Vernacular Architecture World Wide*. (London: Phaidon Press, 2003).
- 4 Frey, "New vernacular architecture vs. sustainable development?," 2014.
- 5 Norberg-Schulz, Ch. *Genius Loci: paysage, ambiance et architecture*. (Liège: Mardaga, 1981).
- 6 Guillaud, H. "Socio-cultural sustainability in vernacular architecture," in: Correia M., Dipasquale L., Mecca S. (eds.), 2014.
- 7 Carlos G., "Research method and operative approach," in: Correia M., Dipasquale L., Mecca S. (eds.), 2014.
- 8 Correia, M., Dipasquale, L., Mecca S. (eds.), 2014.
- 9 Cosenza, G., Jodice, M. *Procida. Un'architettura del Mediterraneo*. (Napoli: Ed CLEAN, 2002).

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