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Imagining the future has always been the task of architects, but do they still have the tools to do it?

Giancarlo De Carlo had no doubts. By definition, the role of the architect is to prefigure the future, to persuade others of their reasons, to design what still does not exist, and to coordinate the various results so they can be implemented. De Carlo was certainly aware of his position within society and felt the capacity to imagine and design the future as his own (Lima, 2020).

### Climate Change

Today, radical climate change and a severe lack of resources

imply a complex situation which design and planning activities should address in the near future.

Due to human-induced climate change, today we are living in the Anthropocene epoch (Crutzen, 2006).

According to data from the Global Alliance for Buildings and Construction, the building sector was responsible for 36% of global energy consumption and 39% of atmospheric CO<sub>2</sub> emissions in 2019 (Global Alliance for Buildings and Construction, 2019).

With the growing population and consequences of climate change, sustainable architecture is considered one of today's main challenges. Engineers and architects are contributing to reducing waste, maximizing building efficiency, and incorporating recyclable materials within structures, as well as harmonically blending new constructions into the surrounding environment.

As humans, we have always adapted our existence in the world through objects and tools, constructing spaces to give a (precise) shape to the image of the future environment in which we will live. Today, however, we are overpowered by a feeling of accelerating time, technological transformation, and a rapidly changing society, creating worry and deep expectations at the same time<sup>1</sup>.

In fact, it is clear that with the great spread of digital technologies, the project culture is undergoing significant changes (Lucarelli, 2020).

Today the architectural project lies at the centre of discussion as a complex phenomenon capable of summarizing scientific, social, political, and cultural points of view at a time when the anthropocentric perspective has radically changed our approach to the environment, construction, technology, and materials, given their impact and effects on the scarcity of resources.

Sandra Piesik confirms the need for a new holistic, multidisciplinary approach that knows how to blend modern advantages with solutions developed by humans over the millennia. Only thus will it be possible to address challenges of this type. The keyword for the future is "adaptation": «If we do not want to be struck by the most devastating effects of climate change, we have to take a holistic approach that integrates the benefits of modernity with the solutions developed by humanity over millennia. To do this, more multidisciplinary and interaction among different bodies of knowledge are needed» (Piesik, 2017).

Nature-based solutions (NBS) are systems that provide cities with

multiple services and represent a way to address urban problems with a holistic approach. These are defined by the European Commission as «solutions inspired and supported by nature [...] designed to address various societal challenges efficiently through adaptation to the resources and to simultaneously provide environmental, social and economic benefits» (Bauduceau et al., 2015). Nature-based solutions represent emerging, innovative tools to address urban environmental and social challenges.

«Adaptation to climate change profoundly deconstructs the planning of urban projects and architecture, inviting us to introduce risk in the various phases of city programming, planning, design, and construction through a more holistic approach among areas of knowledge» (Manigrasso, 2012).

The international scientific community, and the Intergovernmental Panel of Climate Change (IPCC) in particular, now largely recognize that the decisive, specific contribution of human activities has become superimposed on the natural cyclic mutations that have historically occurred in previous millennia. At the centre of this scenario is the city, the place where the main human activities are conducted and where the population is concentrated; the place where the effects are most severe due to the prevalence of artificial objects over nature, and therefore where resilience must be ensured by humans themselves.

The report by the Intergovernmental Panel of Climate Change (IPCC, 2018) confirms that a rapid decarbonization of 50% by 2030 and of 100% by 2050 will be necessary to avoid a climate catastrophe. These challenges affect daily existence in the biosphere and require the alignment of short-term design actions with long-term objectives.

Many cities around the world have introduced the issue of climate change in their urban policies (Los Angeles, Chicago, New York, London, Rotterdam, etc.), creating original tools (climate plans, adaptation plans, sustainability plans, etc.) in which a complex palimpsest of adaptation strategies has been organized.

Among the programming points presented at COP25 in Madrid (UN Climate Change Conference), the following may be cited: growing awareness in the building production chain to identify the new competencies necessary for professionals to organize architectural, urban and landscape projects on the premise of sustainability; aiming to be key representatives to ensure that cities and infrastructure are designed in accordance with international objectives, in particular considering the 2030 Agenda for Sustainable Development and the European Roadmap 2050; requesting that the National Plan for Adaptation to Climate Change (Piano Nazionale di Adattamento ai Cambiamenti Climatici, PNACC) be updated; building an open-source database of materials, technologies, detailed solutions, and innovations available for the profession and feeding exchange with the business world.

## Natural capital

The development of our society has always been based on the use of the natural resources available on our planet, such as air, water, soil, geological resources, and living organisms. It is precisely this set of natural goods that constitutes what is called “natural capital and it is the good state of this capital that guarantees the social and economic well-being of our society.

The concept of economics is closely tied to the concept of ecology – also from the etymological point of view – in that social development and collective well-being depend on the balanced use of natural resources and all the services and goods deriving from them. It follows that imbalances between the two lead to weakening in the ecosystems and, therefore in the related ecosystem services.

The Millennium Ecosystem Assessment (MEA)<sup>2</sup> has calculated that the loss of ecosystem services contributes to food and energy insecurity, increases vulnerability to natural disasters, decreases the level of health, reduces the availability and quality of water resources, and undermines the cultural heritage. However, since the value of these services is not recorded on the market of economic and manufacturing services, they are not given adequate weight in decision-making policies even though they constitute the total economic value of the planet. From the political point of view, the fact that natural capital has not been assigned an adequate role in economic processes constitutes an urgent problem today and it certainly lacks an awareness and ecological culture for which the idea of sustainable development can be embraced on the individual and collective level. The severe lack of resources and radical climate change constitute a complex scenario that design and project activities will have to address in the near future.

The scientific community agrees on the fact that human activities – such as industry, domestic heating, vehicular traffic, and farming/herding activities – have led to an ever growing increase in greenhouse gases in the atmosphere since the alteration of atmospheric balances is mainly due to the use of fossil fuels. It should also be noted that deforestation constitutes 25% of CO<sub>2</sub> emissions on the planetary scale.

The concentration of CO<sub>2</sub> in the atmosphere has increased by 40% in the last 200 years, causing global warming and all its related problems. The reversal of this process is deemed to be impossible, and a hypothetical slowing would require a profound change in political, economic, productive, social, and energy terms.

In this vision, forests represent a fundamental resource for well-being on a global level, not only in the present, but especially for future generations. They are therefore an essential heritage on which our existence depends; it is our duty to guarantee their protection and feed their growth. In this sense, awareness and collective knowledge regarding these issues are the starting point for understanding the problem.

## Biodiversity

Biodiversity is an essential component of natural capital due to its intrinsic value and related activities. Heterogeneity on a climate and lithological/morphological level allow for the presence of a notable variety of vegetation, fauna, and ecosystems. The system of protected areas is essential in this sense. They occupy 21% of the terrestrial territory and 19,1% of the national marine surface area, and are presented as a major path for conserving biodiversity. These areas are also rich in archaeological, historical, architectural, and artistic goods, thereby strongly tying the protection of natural capital to the protection of cultural capital since throughout history, the relationship between nature and related human activities has inextricably shaped the character of the territory. Many sites have been recognized by UNESCO for their cultural and aesthetic quality, which is also tied, for example, to excellence in food and agriculture. Such a strong link has guaranteed the integration and protection of both and demonstrates the existence of a historical relationship between humans and nature.

In Europe, Italy is one of the countries with the most land and marine biodiversity – the fauna includes more than 58.000 species, of which 98% are insects and other invertebrates – and most habitats that host living species are found in the national parks. Italy has 24 national parks extending over nearly 1,5 million hectares of land and 70.000 hectares of sea. The parks play a very important role in combatting the greenhouse effect and land consumption; the forest surface is capable of absorbing 50% of the carbon dioxide emitted in a year. Today the list of invasive species is growing, a phenomenon that tends to be due to anthropic activities. This represents a threat in that the spread of these species is potentially damaging to human health, the environment, and related economic activities. In addition, they tend to spread invasively and thereby threaten native species. According to the International Union for Conservation of Nature Red Lists, around 1.400 plant species and 672 vertebrate species are deemed at risk of extinction. Traditional agricultural, herding, and forestation practices strongly depend on the habitats in which they are carried out and the conservation and protection of the territory is therefore very important, not only on the purely environmental level, but also on the social, economic, productive, historical, cultural, and identity levels.

The impacts of climate change make the conservation of large natural areas even more important, since the probability of maintaining habitats suitable for threatened species there is higher. Nevertheless, it will be necessary to increase the extent of the natural habitats to compensate for losses caused by climate change or human-induced modifications. The reconstitution of habitats and the designation of possible new protected areas should therefore be incentivized and planned, considering future climate spaces for at-risk species and the need to reduce the fragmentation of existing natural habitats.

### **The forest as heritage to preserve**

Four billion hectares, that is, 31% of the Earth's land area is covered by forest, based on data from the FAO (Food and Agriculture Organization of the United Nations). More than a third of this (1,4 billion hectares) is classified as old-growth forest, that is, forest without visible signs of human intervention. Forest area protected in the form of national parks or natural protected areas has increased by more than 94 million hectares since 1990, equal to 13% of the total forest area (FAO, 2020).

In Italy, more than a third of the national territory is occupied by 12 billion trees, 11 million hectares of forest, and nearly 2 million hectares of other forested land. Without maintenance, however, there is an increased risk of fires that are disastrous for the environment and biodiversity (Mipaaf, 2019).

In the last hundred years, forested area has increased constantly. Based on the three national forest inventories made in 1985, 2005, and 2015, an annual increase in the total forest surface was observed: 0,3% between 1985 and 2005, and 0,2% between 2005 and 2015.

The project, called CORINE Land Cover (CLC), was created on the European level specifically to survey and monitor coverage characteristics and land use, with particular attention for the needs of environmental protection (CORINE Land Cover, 2020). The goal was to create a mosaic of Europe as of 2006 based on satellite images, thereby deriving the digital land use/coverage maps for 2006 and maps of the related changes. The study showed that from 1990 to today, in Italy there has been an increase in forested and urbanized area to the detriment of agricultural lands, primarily due to the progressive abandonment of agricultural activities in favour of growing urbanization.

The expansion and recovery of spaces by the forest is not the fruit of forward-looking policies to protect and "renaturalize" the territory, but rather the result of progressive depopulation and neglect of cultivation and management of the territory and rural, mountain, and inland areas of the country. Contributing to this increase in forested area are not only numerous acts of reforestation implemented over the years, but also national (e.g. Progetto Speciale 24, formerly CASMEZ), and especially European (Council Reg. (EEC) no. 2080/92, programme for rural development 2001-2006, 2007-2013, 2014-2020) incentives to plant forests and woodlands on agricultural and non-agricultural land.

Sustainability in architecture – aimed at reducing human impacts on the environment and thereby avoiding the depletion of energy and materials – translates into a careful choice of techniques, morphologies, and components. «The role of architecture in the era of sustainability therefore shifts from the defence of people against nature to the protection of nature from human impacts» (Raman, 2007).

It is clear, therefore, that nature-based solutions can improve the liveability and prosperity of cities, providing services for ecosystems (Millennium Ecosystems Assessment, 2005).

Forests and the forestry sector represent a fundamental component of our country in terms of the landscape, environment, and economics.

The role of the forest and its rational management is recognized and demanded on an international and European level to support a new, more sustainable model of development for present and future generations. Forests and their sustainable management are becoming increasingly recognized as a fundamental tool in the prevention of hydrogeological risks, the fight against climate change, biodiversity and landscape protection, etc. At the same time, the forest represents an important renewable resource for production and energy.

As a component of the national natural capital and a good of important public interest, forests perform a strategic role. They represent the past, our identity, and the future that the world is constructing.

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01 | Chicago. Photography by Marco Introini

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05 | Los Angeles. Photography by Marco Introini

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06 | Los Angeles. Photography by Marco Introini



07 | Los Angeles. Photography by Marco Introini



08 | New York. Photography by Marco Introini



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12 | Pigra (CO). Photography by Marco Introini

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16 | Ostiglia (MN). Photography by Marco Introini

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18 | Marmirolo (MN). Photography by Marco Introini



19 | Marmirolo (MN). Photography by Marco Introini



20 | Val di Fiemme (TN). Photography by Marco Introini



21 | Val di Fiemme (TN). Photography by Marco Introini

## NOTES

<sup>1</sup> Paoletti, I., Campioli, A., and Converso, S. (2020), *Call for paper Techne Special Issue n. 2*, Firenze University Press, Florence.

<sup>2</sup> The Millennium Ecosystems Assessment (MEA) was a research project that started in 2001 with the support of the United Nations that aimed to identify changes in the ecosystems and develop scenarios for the future based on trends in the changes.

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