

Urban legacies
of the late 20th century

GRAND PROJECTS

CONFERENCE PROCEEDINGS

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98 Ecological design strategies for urban spaces in European World Expos

From Bioclimatic Control to Sustainability

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ABSTRACT

Since its inception, World Expositions have anticipated innovations and new design systems in relation to the issues that concern the society of every historical period. Producing an important contribution and impact on the design solutions of each era as pilot experiences and experimental systems.

Our investigation focuses on the analysis of bioclimatic and ecological design strategies together with technological solutions for urban spaces in European World Expos during the 1990 to 2000 decade. From Seville World Expo in 1992 to Hannover World Expo in 2000. Thus, highlighting the evolution from a user comfort point of view in terms of bioclimatic control into an ecological sustainable approach, identifying the experiences of the Seville World Expo as a turning point in a global planning for the development of ecological oriented strategies in urban scale.

The systems are exposed and analyzed within their historical and geographical context, showing their ability to adapt in urban or geographical situations of a similar nature in contemporary contexts and proposing possibilities for their use and future development.

This decade of World Expos, highlight the development of experimental systems, bioclimatic experiences and ecological design in urban spaces that will have an impact for its adequacy and implementation in future solutions.

We will witness a redefinition of the parameters and values that Expos represent with the arrival of the end of the century. Where the recovery and preservation of balance with the ecosystem will be part of the conceptual ideology of these international events.

Keywords: Expo, ecological, bioclimatism, sustainability.

1. Introduction

In the European Universal and International Exhibitions held in the last decade of the twentieth century, we will find an important influence of themes related to ecology and sustainability, which will lead to the development and establishment of objectives that will lay the foundations for the emergence of a new way to conceptualize and understand these types of events.

This will be largely due to the holding of a significant number of summits and international conferences during the decade. These will generate a global sensitivity and set up the foundations for concepts such as sustainable development and the interdependence of different socio-economic factors in the development of humanity and its relationship with the environment.

The most prominent the United Nations Conference on Environment and Development, Earth Summit, held in Rio de Janeiro in June 1992, will serve as support for the development of the so-called Agenda 21:

(...) a daring program of action calling for new strategies to invest in the future to achieve overall sustainable development in the 21st century...from new methods of education, to new ways of preserving natural resources and new ways of participating in a sustainable economy. (United Nations, n.d., p. 4)

Afterwards and inspired on the Earth Summit, will be held in Alborg, Denmark, 1994, the first European Conference on Sustainable Cities and Towns, this conference will take place on its second and third edition in Lisbon 1996 and Hannover in 2000.

On the other hand, this historical period coincides with the birth and first years of development of the European Union, *Treaty on European Union*, signed in 1992 and effective from 1993. New socio-political context in which the countries that host these events are included. Thus, these exhibitions will also serve as integrative elements in this new socio-political and economic reality.

Motivated by this context, we will witness a redefinition of the parameters and values that World's Fairs represent with the arrival of the end of the century. Where the recovery and conservation of balance with the ecosystem will be part of the conceptual ideology of this type of international events. Thus, the Universal and International Exhibitions of this period will include, intrinsically or in some area of their development, strategies for the achievement of ecological or sustainable objectives on their agendas.

In events of this magnitude and impact, within urban and architectural contexts, the term ecology expands, considering strategies of: integration and adaptation in dialogue with the existing territory and city, landscape implementation or urban space and recovery and preservation from sustainability.

An important characteristic of this type of events is its duality. They should serve both the development period of the Expo and the subsequent Post-Expo. With the particularity that its function and its duration in time are very different. The Expo period is very compact and with clearly defined functionality and the Post-Expo period is long lasting, hosting less specific functions. Thus, the implantation of Expos will generate infrastructural problems related to their location and socio-cultural and economic problems in relation to their adaptation and functional transition over time.

World's Fairs involve not only the development of a temporary international event but also the development of proposals for urban insertion of catalytic nature in hosting cities. This fact raises challenges in strategic management that influence the territorial definition and the development of infrastructures both at the state level and at the metropolitan level, such as highways, airports, bridges, high-speed railway lines, accesses to the city, etc.

In the case of this research, we would like to highlight strategies carried out at four World and International exhibitions of this period, see table 1, all of them within the European context.

Table 1 - Universal and International Exhibitions in Europe in the 1990s

Expo (Official Designation) & Year	Type	Participants Countries (Official)	Schedule / Duration	Size (ha)	Visitors (n° people)	Location	Theme
Universal Exhibition of Seville - 1992	World Exhibition	108	20/04/1992 12/10/1992 / 5 Months - 22 days	215	41,814,571	Seville, Spain	The Age of Discovery
Specialized International Exposition Genoa 1992	International Specialized Expo	54	15/05/1992 15/08/1992 / 3 Months	6	1,706,148	Genoa, Italy	Christopher Columbus: The Ship and the Sea
Lisboa Expo'98 - 1998 Lisbon World Exposition	International Specialized Expo	143	22/05/1998 30/09/1998 / 4 Months - 10 Days	50	10,128,204	Lisbon, Portugal	The Oceans: a heritage for the Future
Expo 2000 Hannover	World Exhibition	174	01/06/2000 31/10/2000 / 5 Months	160	18,100,000	Hannover, Germany	Humankind - Nature - Technology

Source: Own creation based on (BIE, Bureau International des Expositions, n.d.).

The relevance of the chosen examples lies in the demonstration of the transition from classic World's Fairs models to new models where a new sensitivity prevails. Characterized by: the proposal of solutions for urban insertion at territorial and metropolitan scale, the development of environmental and landscape proposals for urban spaces, the generation of solutions of programmatic continuity post-Expo and the importance of sustainability in the governance of this type of event. Highlighting specifically:

- The recovery and urban integration in Genoa 92. Adaptation of existing structures and regeneration of areas of the city of important historical character.
- The importance of landscape and bioclimatic design for the implementation of urban space in Seville 92.
- The Expo as a strategy for implementing the objectives of the Urban Plan of the City and the enhancement of large urban areas of metropolitan level in Lisbon 98.
- Sustainability as conceptualization and governance in Hannover 2000.

These strategies will be paradigmatic examples and will set guidelines for the development of future Universal and International Exhibitions not only in Europe but also in the World. They will also serve as a laboratory for the implementation of this type of urban and architectural interventions in non-related World's Fairs contexts.

2. Genoa 1992. Urban Restoration and Rehabilitation

The Genoa 92 International Specialized Expo took place at the same time as the Seville 92 World Exhibition. The event was located at the Porto Antico area, developed through a process of urban renovation and architectural adaptation. The intervention will produce a harmonious spatial and functional transition with the ancient city.

The architect in charge of the project, Renzo Piano, proposes a global intervention in the area, consisting on an adaptation of the public space for the Expo purposes that include the renovation of existing buildings and the creation of new iconic buildings. The solution will involve the transformation of the pier and its urban space creating a connection between the Expo site and the historical urban fabric.

This urban renovation opportunity involves a relevant intervention, with the predominance of pedestrian spaces that will connect the historical city with the planned Expo area. Thus, the access roads to the port area will be expanded and esplanades will be developed generating spatial openness and a clear connection with the port.

Via Aurelia, SS1, built in the 60s and one of the most important highways in the country, passes through this area of the city as an elevated highway, generating an important barrier between the historic city and the port area (Archilovers, 2017). Expo 92 will create a spatial continuity between both areas of the city, below the highway, through the treatment of urban space.

In terms of architectural renovation and adaptation the project of *Magazzini del Cotone*, cotton warehouses, one of the oldest buildings in the port, will be transformed into a library and auditorium, currently a conference center.

On the other hand, within this growing interest in ecology, the sea pavilion, the city's current aquarium, stands out, where the emblematic Biosphere is included. The latter, inhabited by 150 animal and plant organisms as a fragment of a tropical rainforest artificially maintained and included in a spherical steel and glass building.

3. Expo 92 Seville. Bioclimatic Landscape

3.1 Expo 92 Master Plan

An environmental approach with the predominance of green spaces characterizes the winning proposals of the international competition for the development of the Expo 92 master plan in 1986. Although the comprehensive use of the site after expo is still not conceived from sustainability principles, the master plans propose the creation of large public spaces with parks, lagoons and gardens that will give the city a new landscaping reference at the end of the fair. From an ecological position, an important reforestation program is proposed in the Universal Exhibition area, *Isla de la Cartuja*, complemented with a bioclimatic treatment of public spaces during the Expo 92.

The winning proposal, unrealized, by the Argentine architect Emilio Ambasz, poses three large lagoons that adapt to the banks of the Guadalquivir river where floating pavilions can be removed at the end of Expo 92. The Ambasz plan proposes a minimal use of infrastructures but the use of ferries to transport the visitors from the city into the Expo site.

Finally, a team of architects composed by: Rafael de la Hoz, Alejandro de la Sota and Julio Cano Lasso will be in charge of making the final master plan proposal. Where the environmental approach is limited in favor of a classic type of Expo arrangement in which the pavilions are organized around avenues and streets with clearly sectorized spaces.

3.2 The Landscape Project

Prior to the development of Expo 92, on *Isla de La Cartuja*, ideas were already

being raised for the creation of a metropolitan park and its connection with the existing green spaces in the city through the riverbank, enhancing their use as landscaped public spaces.

It is not surprising that for Expo 92 an ambitious landscape plan is developed where parks and gardens will be created both within the Expo and in its neighboring areas. All of this complemented with the creation of *Programa Raices*, a program to incorporate a large number of foreign species from the American continent. According to Forgey (1992) in Seville Expo 92: “Greenery proliferates. About 25,000 trees and 300,000 shrubs have been planted on formerly desolate land, officials report. The main streets are covered with a two-tiered trellis system, with leafy vines growing from both upper and lower tiers (...)” (p. 13)

3.3 Urban Design Strategies. Bioclimatism at Expo 92

Urban design at Expo 92 stands out for its great aesthetic cohesion and spatial continuity throughout the site, facilitating its use as an outdoor space for rest and leisure. Water, see fig. 1, will be the structuring element in the form of masses and curtains of water, fountains and waterfalls. Together with its use in bioclimatic systems within circuits under paving, irrigation, sprinkling and micronization.



Fig. 1 – *The Lake in Expo 92*. Source: (Ortiz Martínez de Carnero, 1992)

Bioclimatic strategies in Expo 92 are based on an adaptation of vernacular passive conditioning strategies in dry climates combined with the use of new technologies for its application in urban spaces (López de Asiain, 2001). These proposals aim to solve problems related to visitor comfort during the Expo 92 period, especially in summer months. They will consist of shade production systems, water evaporation systems, fresh air confinement systems, systems for using the thermal mass of pavements and other built elements; that together with the vegetation will collaborate in obtaining a global effect. As a detail of these solutions,

one of the symbolic landmarks of the urban space in Expo 92, the Bioclimatic Sphere, consisting of a large 22-meter diameter sphere composed of micronizers that cover its surface.

An important aspect for the development of the bioclimatic project during Expo 92 was the creation of a full-scale model, *La Rotonda Bioclimática*, which will serve as an area for experimentation and testing of the systems. Thus, natural air-cooling techniques, covers for different types of passageways, ponds with fountains and dimensions of elements are tested. The evaluations will be registered during the summers of 1988 and 1989. This space also serves as a sample of the overall effect of urban space design, its scale, composition and materialization.

4. Expo Lisbon 98. Urban Transformation and Integration with the Existing City

4.1 Expo 98 Master Plan

In the case of Lisbon, the urban insertion plan and post-Expo, is more ambitious compared to Expo Genoa. With practically 10 times more area, 6 hectares at Expo Genoa versus 50 hectares at Expo 98. Both international exhibitions. In Lisbon 98, its conceptualization and planning model establishes the creation of a new centrality within the metropolitan context of Lisbon. Thus, *Parque das Nações*, is conceived with capacity to integrate the Expo and allowing its development after the end of the event.

While at Expo Genova 92, we identified a local urban renovation, Expo Lisbon 98 will transform a larger post-industrial strategic area, enhancing the city’s relationship with the Tagus River and modernizing its identity within the context of the newly formed European Union.

Composed by a team of architects and urbanists, *Parque Expo SA*, was in charge of the complete planning of the event, led by the architect and urban planner Vassalo Rosa. They will set among its objectives the integration of Expo 98 urban plan on the 1992 strategic plan of Lisbon and generate a new urban center for the city after the Expo (Lopes Simoes Aelbrecht, 2014). Thus, the inclusion of mixed uses such as residential, services or commercial, and the improvement of the infrastructures will facilitate the creation of a neighborhood and its integration in the city after the event.

4.2 Expo 98 Architecture and Urban Space

The architecture in Expo 98 is planned from both permanence and temporality. With outstanding permanent works such as the Portugal Pavilion, designed by Alvaro Siza, currently used as an exhibition space, and others such as the Atlantico

Pavillion, nowadays Altice Arena that hosts concerts, conventions or sporting events. On the other hand, the temporary pavilions of participating countries were planned as modular solutions of 16 x 16 m., 256 m² (Lopes Simoes Aelbrecht, 2014).

With the idea of their future incorporation into the city, public spaces are organized through axes that incorporate different functions equipped with pedestrian and road access. This strategy is reinforced with the location of the main public buildings on the site periphery. (Lopes Simoes Aelbrecht, 2014) Along the riverbank, reserved for pedestrian access, the activities will be concentrated on leisure functions.

Finally, important infrastructural projects are developed to solve access problems to the Expo '98 programmed area such as the Vasco da Gama Bridge, the construction, extension or reconstruction of numerous road axes and interventions in the national road network.

5. Expo Hannover 2000. Sustainable and Environmentally Sensitive

5.1 Expo Hannover 2000 Master Plan

Hannover 2000 planning is conceptualized from parameters based on sustainability with an important ecological character. In order to promote sustainability and its values in a comprehensive and exemplary way, the exhibition will establish principles that will serve as guidelines for the assessment of important strategic decisions in the development of the event.

Expo Hannover 2000, will be the first World Fair in which the BIE.¹, will allow the use of existing structures (Chappell, n.d.), in this case the ones corresponding to the Hannover fair, complemented with two areas of pavilions and thematic gardens. This aspect will entail, according to Bonomini². (2017),

“(…) a significant change in terms of environmental and economic impact in the conception and realization of large events. It has only been necessary to build 30% of the facilities, which at the end of the Expo must be dismantled, recycled or reinstalled (…”. (p. 266)

The winners of the international competition for the development of the master plan of the Expo Hannover 2000, in 1992, were the Swiss architects Arnaboldi and Cavadini. They propose the use of the existing exhibition structures of the Hannover fair and their extension.

¹ BIE, Bureau International des Expositions. Intergovernmental Organization in charge of evaluating the quality and integrity of the Exhibitions

² Citation translated from Spanish to English by the author

The update and documentation of the definitive master plan, will be developed by the office of the German urban planner Albert Speer, AS&P. This office will also be in charge of the construction of the site in collaboration with the architect Thomas Herzog and the landscape architect Dieter Kienast.

Hannover 2000 Post-Expo: Continuity and Evolution. The development of the urban management after Expo, *Hannover 2001 Program*, will propose the application of sustainable models for the development of the site within the Kronsberg neighborhood. According to Bonomini³. “(…) an attempt is made to put into practice what is required by Agenda 21, responding not only to its ecological but social requirements (…)” (p.269).

5.2 The Hannover Principles and World Wide Projects

“By choosing ‘Humanity, Nature, and Technology’ as the theme for EXPO 2000, (…), humanity will redefine itself, its placement in nature, and refine the role of technology within the environment.” (McDonough, 1992, p. 2).

The Hannover Principles, by the American architect William McDonough, 1992, poses a guide for the design and development of a sustainable Expo project in all its scales from urban infrastructures to national pavilions, not only in relation to construction parameters but also as a guide to the thematic contents. With an important didactic and exemplary approach based on the practical application of a new design philosophy based on sustainability.

A new design philosophy that enhances interdependence with nature at every level: land use, water, air, materials, wastes, energy and responsibility. Along with the learning from natural models and their cycles, the efficient and sustainable use of energy and the disappearance of the concept of waste.

The transport systems in Expo 2000 will prioritize pedestrians and cyclists, the use of efficient zero-emission vehicles and public transportation running on clean renewable energy sources.

On the educational side and dissemination of the values associated with sustainability, Expo 2000 proposes expanding beyond its borders and visitors. Thus McDonough (1992) will propose: “(…) approaches to decentralizing the fair (…) incorporate pavilions or centers in other countries, (…), that might be linked by electronic means such as” tele-presence “communications technology.” (p. 11)

This initiative will be developed during the Expo through the *World Wide Projects* program⁴, which are public calls for financing projects in different areas of the

³ Citation translated from Spanish to English by the author

⁴ More information on World Wide Projects at, www.nwwp.de

planet. These will present concrete solutions in relation to sustainable development and ecology and will propose strategies for the implementation of living conditions on the planet.

5.3 Architecture in Expo Hannover 2000

The parameters of sustainability and temporality will lead to interesting architectural solutions such as: the Swiss pavilion designed by Peter Zumthor in wood that will be reused when disassembled, or the Japan pavilion by Shigeru Ban consisting of a hybrid vaulted structure of cardboard tubes and laminated wood.

The most emblematic pavilion of the Expo, the pavilion of the Netherlands, designed by MVRDV, will perform an interpretation of the principles, where nature will be considered from its hybridization with technology. Valuing its redefinition as a concept from artificiality and raising questions and problems of global nature, such as the increase in population density and quality of life.

“Reflection on these issues may be the contribution of Holland to the ecological objective of this universal exhibition, which seems to have simply remained in a romantic vision of rejection of technology and consumer society.” (MVRDV, 2000, p. 48).

6. Conclusions

Throughout the 90s, we will witness a process of evolution related with the integration of the impact of this type of events in the cities that host them. We must not forget that these cities undergo an acceleration process in their development, from hosting an event of global magnitude for a short period of 3 to 5 months, which will become obsolete after its completion. In addition, the event will provide the city with a powerful infrastructure and urban fabric that has to be reprogrammed to absorb new functions.

Through the introduced examples, we have been able to understand the transition from a classic approach in the planning and conceptualization of the Expos, at the beginning of the decade, to a sustainable understanding of the Expo and its Post-Expo development at the end of the decade.

In the case of the International Exhibitions, Genoa 92 and Lisbon 98, the event will be the opportunity to carry out the renovation of an area of the city from strategies of restoration and urban adaptation that will generate new urban identities and areas of centrality.

On the other hand, in the case of the Universal Exhibitions, Seville 92 and Hannover 2000, we observe an evolution of the master plan from landscape-type approaches

to sustainable proposals that pose long-term strategies for the development of the urban fabric in relation with the territory.

In the case of urban design, we observe proposals of different nature in each exhibition, although it seems that urban design proposals with great acceptance during the period of the Expo do not have the capacity to continue after the Expo and vice versa.

The permanent architecture of emblematic pavilions will evolve into temporary sustainable proposals with the prevalence of recycling materials and the integral use of existing structures. Thus, in Genoa 92 we oversee the adaptation and restoration of existing buildings to host Expo functions. In Lisbon 98, there is a clear differentiation between permanent pavilions and temporary structures and in Hannover 2000 the architecture as a whole will be conceived primarily on a temporary basis.

Finally, it is interesting to highlight the pronounced change in the conceptualization of the Expo model during this short period. In which we witnessed an important renewal of ideas regarding insertion and development models, from the influence of currents of thought based on ecology and sustainability.

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103 How mega interventions are shaping Tokyo

A critical review

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ABSTRACT

Urban transformation is increasingly determined by singular mega interventions. Some are outlined as mega developments from the outset, others are initiated with temporary character like Olympic games. The legacy of these projects, however, has become an integral part over the past two decades. Both have the capacity to change the image of their cities on a global stage and impact their urban development lastingly.

This contribution investigates, how the growing number of urban mega interventions have been shaping Tokyo, and it looks at their potential to function as trendsetters for new development practices. I focus on two areas in which mega interventions are increasingly setting the tone for a particular mode of spatial production and defining new benchmarks for subsequent projects: sustainability standards and the digitization of our urban environment. While I will draw from a larger selection of case studies of urban megaprojects and Olympic games, I will focus on projects situated in Tokyo including the deferred 2020 Olympic Games.

Mega interventions are spectacular moments of spatial commodification which allows to gather the resources necessary to realize such projects. New practices within the realization of mega interventions are facilitated by an accumulation of local and global investment putting the projects on the top of the list of local and global agencies involved. While powerful catalysts to push urban development at a large scale they are also proliferating urban inequity and uneven distribution of power and resources.

Urban space is central in the making of mega interventions and impacted within and beyond the perimeter of intervention. It also holds the key to building an inclusive and sustainable urban practice.

Keywords: Urban megaprojects, mega events, urban development practice, Tokyo

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