

Land Art in Public Spaces Design: Remediation, Prevention of Environmental Risks and Recycling as a Consequence of the Avant-Garde Activity of Landscape Architecture

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Abstract—Over the last 40 years, there has been a trend in landscape architecture which supporters do not perceive the role of pro-ecological or postmodern solutions in the design of public green spaces as an essential goal, shifting their attention to the 'sculptural' shaping of areas with the use of slopes, hills, embankments, and other forms of terrain. This group of designers can be considered avant-garde, which in its activities refers to land art. Initial research shows that such applications are particularly frequent in places of former post-industrial sites and landfills, utilizing materials such as debris and post-mining waste in their construction. Due to the high degradation of the environment surrounding modern man, the brownfields are a challenge and a field of interest for the representatives of landscape architecture avant-garde, who through their projects try to recover lost lands by means of transformations supported by engineering and ecological knowledge to create places where nature can develop again. The analysis of a dozen or so facilities made it possible to come up with an important conclusion: apart from the cultural aspects (including artistic activities), the green areas formally referring to the land art are important in the process of remediation of post-industrial sites and waste recycling (e. g. from construction sites). In these processes, there is also a potential for applying the concept of Natural Based Solutions, i.e. solutions allowing for the natural development of the site in such a way as to use it to cope with environmental problems, such as e.g. air pollution, soil phytoremediation and climate change. The paper presents examples of modern parks, whose compositions are based on shaping the surface of the terrain in a way referring to the land art, at the same time providing an example of brownfields reuse and application of waste recycling. For the purposes of object analysis, research methods such as historical-interpretation studies, case studies, qualitative research or the method of logical argumentation were used. The obtained results provide information about the role that landscape architecture can have in the process of remediation of degraded areas, at the same time guaranteeing the benefits, such as the shaping of landscapes attractive in terms of visual appearance, low costs of implementation, and improvement of the natural environment quality.

Keywords—Brownfields, landscape architecture, contemporary parks, remediation.

I. INTRODUCTION

NOWADAYS, the activity of architects and landscape architects goes beyond the idea of satisfying the functional needs of society and creating an aesthetic surroundings - this is caused by the ecological crisis and increased awareness of the

need to take care of the environment. In his book [1], Victor Papanek draws attention to the environmental and ecological imbalance of the planet and the need to preserve and conserve land resources, as well as to the changes our consumption, manufacture and recycling patterns. According to the author, designers may have an influence on the improvement of situation. There are three routes they might follow in order to achieve it: throughout individual actions (for example buying fuel – efficient cars), by joining organizations that promote environmental protection and finally – by adapting green design thinking and processes [2]. The latter guideline is often used nowadays for the design of green architecture and infrastructure, but there is a great potential for landscape architects - due to the specific of the profession, they create public spaces in which nature can often freely develop. Of particular environmental importance are the projects developed in the brownfield areas, i.e. post-industrial spaces, which are now becoming a typical element of the city's spatial structure.

According to the applicable polish Governmental Programme [3], those spaces are defined as "degraded, unused or partially used areas originally designated for business activity which terminated". To this definition one should also attach areas degraded through industrial activity, i.e. those in close proximity to industrial plants (e.g. landfills, areas with contaminated soil and water). Abandoned factories, former airports or excavations as areas devoid of a specific function in the field can be transformed into public parks, which spawned a movement of pro-ecological parks, also known as eco-parks. The basic concept was developed alongside, originating in the 1992 Earth Summit in Rio de Janeiro, which turned the architects' attention to aspects related in particular to ecology and sustainable development. Eco-parks are characterized by the fact that they are usually created on post-industrial areas, with minimum involvement of the designer, which is often limited to enabling unhindered movement in the area and installing basic functional elements such as sports facilities, pavilions or toilets. Often the synanthropic flora is maintained and its natural succession ensured. This trend is currently enjoying dynamic growth due to at least two main reasons: firstly, there are more and more post-industrial areas requiring

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reclamation and development, and secondly – this method is relatively cheap in terms of construction costs and maintenance (there is no need, for instance, to maintain the plants which take care of themselves).

Apart from the above-mentioned eco-parks movement, there is another tendency which takes up a challenge of reclamation of post-industrial areas. What strikes one most is how the terrain is treated as a sculpture: shaped through slopes, hills, incisions in the ground or long embankments. These areas resemble works characteristic for land art which is a movement originated in the 1960s and developed mainly in the USA, and later also in Europe (especially England). Artists living on both side of the Atlantic began to turn away from "commercial" art galleries and sought new forms of expression which could not be contained within the walls of a museum. Abandoning the models of easel painting or graphics, the artists gained an interest in creating large-scale sculptures as well as conceptual art in which the creative process itself becomes the subject and is often more important than the work itself (e.g. performance).

At the same time, thanks to awareness of environmental issues and bad living conditions in the city, promoted by Kevin Lynch [4] and Jane Jacobs [5] among others, future representatives of the movement became interested in the natural environment and its relationship with man, making it the main theme of their works. Generally speaking, land art was characterized by the relationship between the work of art artistic endeavours or a source of inspiration (and sometimes both). Sand, soil, plants, water, rocks, untreated wood – these are only some of the materials used by land artists, who found them attractive due to their natural origins. They also used such materials as a form of rebellion, since they were not traditionally used in the fine arts. In the 60s, this movement spawned numerous works which were at the time described as land art, earthworks, earth art or ecologic art. Moreover, all these terms were employed in the titles of collective exhibitions (exhibitions of European and American artists presented in 1968 – 69: Earth Works (Dwan Gallery, New York, 1969), Land Art (broadcast on German TV in April 1969) or Ecologic Art (John Gibson, New York 1969) [6]. It is therefore difficult to decide upon a single name for the movement, as it was never officially defined. However, in Europe the term "land art" is more commonly used, while in USA "earth art" is more frequent. This serves to further illustrate the numerous differences in the activity of artists on both sides of the Atlantic.

The artists were also directly influenced by the contemporary movements in art and architecture. In the first case, this concerned mainly minimal art, which was characterized by a purity and simplicity of form and shape, thus standing in opposition to land art, while inspiring artists to employ organized composition. Conceptual art also played an important role, leading land artists to turn their attention to the creative process itself, thus adding the fourth dimension of time to their works – the objects were often temporary, in extreme cases lasting only a brief moment. This opens up a new perspective on the notion of the transience and changeability of the work of art, which in this case may, for instance, be destroyed by weather conditions, overgrowth and, ultimately, complete

disappearance.

II. LAND ART AND LANDSCAPE ARCHITECTURE AVANT-GARDE

Land art is nowadays often used as an inspiration in the process of creating public spaces, manifesting itself mainly in the use of land forms as significant compositional elements. Although landscape architecture is primarily an engineering discipline of science, and land art is an artistic movement, their origins seem closely related. The means of expression, spatial forms used by the architects and artists (see Fig. 1), and the archetypes (see Table I) that inspire them seem to overlap.

TABLE I
 COMPARING THE OCCURRENCE OF ARCHETYPES IN NATURE, CULTURAL HISTORY, LAND ART AND LANDSCAPE ARCHITECTURE WORKS

Archetype	Nature	Prehistory / history	Land art	Landscape architecture
Meandering line	River, spring	The Serpent Mound (Ohio, USA)	Andy Goldsworthy 'Storm King Wall'	Maya Lin 'Eleven Minute Time'
Mound	Hill	Tumulus / burial mound	Robert Smithson, 'Broken Circle/Spiral Hill'	Charles Jenks 'Spirals of time'
Line	Spring, sunbeam	Canals in Mauritanian gardens	Richard Long 'Walking in Line'	Dani Karavan 'Way of peace'
Circle	Sun, stars	Stonehenge	Robert Morris 'Observatory'	SWA Group, 'Burj Khalifa Park and Plaza'
Spiral	Shell, Milky Way	Symbols characteristic of the Celtic culture	Robert Smithson 'Spiral Jetty'	Charles Jenks 'Garden of Cosmic Speculations'

It is originated in the works of landscape architects like Maya Lin, Dani Karavan and Isamu Noguchi. What connects those persons is not only the fact that they designed public spaces but also that they all have an artistic education (sculpture, painting) as opposed to a strictly architectural one, which may have contributed to the creation of a separate and peculiar creative language. Another feature is the use of simple, minimalistic and often large-scale elements, such as the white, concrete statues created by Noguchi and Karavan. It seems appropriate to apply the term avant-garde here, since it can be defined as artistic or, in this case, architectural autonomy, breaking away from traditional movements and creating a unique language of expression, which in this case is often highly symbolic. Initially a small group, possibly related more to high art than landscape architecture as a technical field, these people inspired a wide circle of designers who have been active from the 90s to this day. The architects employ unconventional solutions and complex shapes, as well as surprising cubic objects to attract the public and draw them into a dialogue with their work, most often conveying a specific idea or narrative. These solutions are a far cry from traditional landscape art – it seems their main role is not to provide a clear composition or green enclave but rather to give the design an eccentric and individualistic character expressed through elements such as complex pavilion structures or land objects, vivid colors, dynamic shapes and the use of forms of expressions such as minimalism or pastiche.

Contemporary landscape architects whose work clearly reflects this phenomenon include Martha Schwarz, Kathryn Gustafson, Maya Lin, George Hargreaves and Adrian Geuze – their works

are well known in the industry, often portrayed as examples of good design practices and serving as an inspiration to all young landscape architects.



Fig. 1 Comparing land art and landscape architecture

III. CASES STUDIES

Comparisons with high art do not end with avant-garde. For at least twenty years scholars have observed and researched the connection between landscape architecture and the so-called land art or earth art. This topic is explored, among others, by Professor Udo Weilacher [7] of the Technical University of Munich. Such research is grounded in the fact that the designers shape land forms in an organized, sculpture-like manner, use natural materials as well as create specific installations (temporary and permanent) which very often appear in urban spaces. Moreover, public areas inspired by land art are popular among visitors and experts alike, and have received numerous prestigious awards. The objects themselves become a recognizable element of the image of districts, and even whole cities. Thus, on the one hand these objects have a positive impact on the development of landscape architecture – they are intriguing, unique, convey elements of contemporary art in a way that is accessible to everyone, and liven up the public

space. On the other hand, they carry a certain risk, namely the desire to use connotations to land art as a recipe for creative success, resulting in the commercialization of this phenomenon. Interestingly enough, this dilemma perfectly fits the essence of avant-garde artists, who fight tradition and strive for splendour but must avoid it so as not to lose their own independence and freshness. Indeed, the avant-garde's popularization is synonymous with its end.

The shaping of public spaces by the avant-garde of landscape architecture is in many cases used for the revitalisation of the previously mentioned post-industrial areas and as a result of the use of recycled materials for the construction of parks, monuments, etc. In order to examine the topic, an analysis of five parks was made, additionally assuming the following criteria:

- They are examples of the use of references to land art in public spaces;
- They were created in post-industrial areas or with the use

- of materials from recycling;
- They were created in the last 50 years;
- They are located in Europe or USA;
- They constitute part of the cultural landscape

A. Northala Fields

Northala Fields was established in 2008 in West London (one of the youngest parks in the city). The designers' intention was to create a vast, attractive visual and recreational space along the A40 motorway. The concept, selected via a competition, was developed by FoRM Associates.

The idea of the park composition is based on the pouring four hills of various sizes (18,22,18 and 12 meters) covered with meadows - these high earth forms play an important role both as objects from which the panorama of London can be admired (e. g. the city center and Canary Wharf), as well as characteristic landmarks, which are a gateway in the western part of the city, standing out from the surrounding flat terrain. The 27 hectare park has a rich selection of attractions for the public - starting from the viewpoints, through playground, walking path systems, meadows and seating places. However, Northala Fields is not only a recreational space - it is also an area designed for nature and pollution elimination. The main attraction of the park - the earth mounds were built with debris, bricks and wood from the demolition of unused facilities, among others from Wembley Stadium, which is an example of recycling construction waste. Moreover, each mound has been created in different soil conditions, which are covered with different mixtures of grasses and flowers, providing four separate habitats. In addition, those high earth forms are important in the reduction of noise and pollution spreading from the nearby motorway.

The park also functions as a system of ecological reservoirs - one of its main elements are meandering watercourses and small lakes, forming enclaves in which the nature characteristic of wetlands can develop. The range of the existing forest area nearby was also extended. The project meets the requirements of the design to minimize potential collisions of birds and aircraft from close proximity to Northolt airport.

B. Parc des Iles

The French Park des Iles in Drocourt and Rouvroi was developed in the place of a former coke plant (operating since 1930), which is now gradually transformed into a public green space. This type of industry is responsible for the emission of large quantities of harmful substances - dusts and gas combustion products enter the air. Coke-ovenants, ammonia, benzene and its derivatives, phenol, hydrogen sulphide and other, in turn water is contaminated with phenols, tar, oils, cyanides, sulphides and ammonium salts and anions such as chlorides, sulphates, sulphides, thiosulphates, etc [8]. In turn, water is contaminated with phenol, hydrogen sulphide and other substances. The implementation of the project was a major challenge due to land pollution and the habits imposed by these prohibited areas. After the final closure of the coking plant in 2003, the area was reclaimed and the greenery planted in several stages. The park concept developed by the Ilex office

has been gradually implemented - so far, 45 ha of the planned 160 ha space has been opened to the public.

The composition of the park is rooted around a system of small islands on an artificial lake, constituting a microniches through which a straight path leads the visitor. Those enclaves were built with excavated materials and were shaped as simple, ellipsoidal, flat shapes framed by gabion edges and supplemented with materials such as wood. The site was shape with 200 000m³ of earthworks cuts and fills. Large post-mining mounds were left in the field and a system of vast meadows - which are confining the most polluted soils was established. In the field there are also attractions for the public - thematic gardens (on islands), open spaces, tracks for Nordic walking, etc. The central island located on the lake was called "Aquaterra" and serves as an educational garden and is a place of environmental awareness raising- including resources conceding [9]. Left mining heaps are used as hills for sports such as cycling, running and paragliding.

Parc des Illes is an example of post-industrial space revitalized for recreational purposes, preceded with recultivation and renaturalisation of the site. Flora nad fauna in the terrain are gradually revived and the park itself has become a hub of destination for the inhabitants of Lille Conurbation, who would like to rest with nature or do outdoor sports. The attractiveness of the site is further enhanced by the park's composition - freely submerged mining heaps contrast and become a background for flat, oblate islands located on the lake. The minimalist approach of designers - using simple shapes and fitting the idea of the park into the existing post-industrial landscape (treating it both as a background and a place of active leisure time) makes it possible to talk about references to the land art.

C. Byxbee Park

Hargreaves Associates studio has for years designed numerous projects based on land art, which shall be understood as a usage of distinctive 'land shaping' with slopes, hills or embankments. The Byxbee Park in Paolo Alto is one of their earliest implementations for which the office was collaborating with two artists: Peter Richards and Michael Oppenheimer. The project spanned the surface of 27 acres and was opened for the public in 1991. It is worth to mention that two years later the conception was recognized by ASLA [10] - the Society honoured the architects with the award for excellence in its annual prestigious competition for the best implementations in the field of landscape architecture and garden design.

The team's task was to develop the concept of public space in the former landfill, which has already been remediated and took the form of large, grassy fields. Because the previous place destination, short-term changes in the area became impossible, so the designers after having a local vision decided to implement in the future park minimally invasive earthworks and artistic installations [11]. These were in turn: hills, field of wooden poles, a composition of jersey barriers arranged in chevrons. Those elements are not only artefacts - they're becoming landmarks (orientation points) which moreover can be seen not only from ground perspective but the sky as well -

chevrons of jersey barriers are pointing in the direction of the Paolo Alto airport, which can be noticed when flying by plane.

Although Byexbee Park does not have a clear recreation activities program, it is a popular tourist destination - the space is complemented by a system of paths, thanks to which visitors can get around and walk comfortably. On the other hand, despite the existence of a functional communication system, the use of durable materials (concrete) and the development of a clear composition of park interiors, this project can be placed on the borderland between land art and landscape architecture. Unfortunately, the unique value of the park, including its visual aspects and attractiveness to the public, failed to protect it from gradual destruction. Currently, because of the planned release to the public of the next area of remediated landfills, the park, which shall be partially rebuilt, is deteriorating - currently among the many structures built there the only ones left are field of wooden poles and a row of concrete curbs visible from the air.

D. Govenors Island Park

The project was selected to perform in an international competition announced and conducted in 2006. The area occupies 29 acres of land in the very prestigious location of the Govenors Island in New York's harbor, near Manhattan and Brooklyn. For over 200 years the island was used as a military base, traces of which can still be seen in structures like Fort Williams (whose construction started in the years 1806-1809 [12]) and a number of former military buildings. The other part of the island for many years functioned as undeveloped open space, which makes the creation of the park an important element in the transformation and revitalization of the area.

To gain proper insight and to determine its potential as a future public space, the designers spent hundreds of hours on the island during which they watched visitors and held mass events [13]. They also carried out a public consultation with the residents of New York. The effect that studio achieved is outstanding - the park fits the context of the New York harbour, highlighting its ecological and cultural values, history and also allows visitors to observe the panoramas of the nearby districts of Manhattan and Brooklyn by linking the viewpoints. The designers wanted to capture the feeling of walking across an open green area surrounded by water and sky - so that visitors can forget that just a few kilometres away, one of the most famous cities in the world is situated.

The basis of the composition is to keep the vast ecological space from which the city skyline can be watch. To enable the framing of views and to diversify the flat surface of the land, the park designers implemented earth embankments with heights from a few to several meters which are constructed out of demolition debris from old buildings formerly located in the area [14]. Undulating paths run on the hills as well as between them, with roads located in the eastern-western direction where the Statue of Liberty can be seen. All the earthworks also serve entertainment purposes - the city skyline can be watched from their top. A playground is scheduled to be built on one of the hills, with slides running along the escarpment. The central area is implemented as a large lawn with a view of Manhattan, sports

grounds and the amphitheatre. Visitor can also take a walk over the waterfront promenade which is designed in line with contemporary trends. The northern part of the park was arranged as botanical gardens, and at the edge it has been provided as an educational area of a swamp. The park contains a large number of plantings that include approximately 3000 trees and shrubs. The composition is complemented by decorative grasses and perennials. In total, 54 species of plants were used, which were selected due to their resistance to the difficult conditions in the port, including resistance to soil salinity and frost proofness.

Govenors Island Park certainly stands out from other parks in New York - it is a popular tourist destination and may significantly contribute to the revitalization of the island.

E. Playa Vista Central Park

Surrounded by office buildings in Playa Vista (Los Angeles, California) there is a small modern park offering visitors numerous attractions. The project has a surface of 7 acres and its composition is based on the system of intersecting straight paths. Along the main axis on a straight avenue passing through the center of the park, which connects the square with seating and the emerging office building (designers refer to the runway formerly located in this area of an old airport Hughes [15]), there are some interesting landscape interiors. The park includes elements such as an amphitheatre, playgrounds for basketball and football, playgrounds for children, as well as wooded areas and lawns. An interesting solution, reminiscent of land art, was to place numerous pyramid-shaped hills on the originally flat ground. The hills were covered with decorative plants characteristic of the Californian climate. Decorative grasses and perennials planted in wide rows or surfaces endow the space with diverse shapes and colors, creating a distinct image. Those colourful hills are the most distinctive element of the park - they fit its modern character and give it its unique identity.

In general Playa Vista Central Park presents itself as a very modern and well-designed public space. Its structure and wide range of elements like benches or small buildings perfectly reflect contemporary trends in landscape architecture. However, the area is not very popular with locals and tourists [16], which is surprising given the extensive program of activities and the unique look. One can only hope that in time, with the development of new office buildings and housing in a nearby location, Playa Vista Central Park will gain importance and appreciation.

IV. CONCLUSION

The examples of projects not only show the existence and activity of the avant-garde of a landscape architecture, but above all show how designers can contribute to improving the natural environment and biodiversity while creating attractive public spaces. The subject appears extremely important due to the possibility of applying Natural Based Solutions (NBA), i.e. solutions enabling the development of natural terrains to help solve issues such as air pollution or climate changes. According to IUCN's classification [17], the following types of approaches

can be observed in post-industrial areas:

- Issue-specific ecosystem-related approaches (e.g. climate adaptation services and ecosystem-based disaster risk reduction);
- Infrastructure-related approaches (e.g. natural infrastructure, green infrastructure);
- Ecosystem-based management approaches (e.g. integral

water resources management).

Also, according to IUCN there are eight preliminary principles which should be considered in conjunction with the NbS definition [18]. The examples of parks discussed above reflect them very well, as shown in the table below (see Table II):

TABLE II
 COMPARING PRELIMINARY PRINCIPLES OF NbS DEFINITION [18] AND THE EXAMPLES FROM CASE STUDIES

Preliminary principles of NbS definition	The examples from case studies
They take into account nature conservation through the application of appropriate rules and standards.	All the projects discussed above were made with a view to revival and future nature conservation in mind.
They can be integrated with other engineering and modern technology solutions.	This principle manifests itself in the use of earthworks, strengthening of slopes and embankments, taking appropriate measures for waste disposal, construction of communication routes, etc.
They are connected with the specificity of a given place - its culture and nature, they combine scientific knowledge with local and cultural issues.	Partial preservation of post-industrial heritage (e. g. mine heaps in Park des Iles), creation of symbolic and characteristic places, framing and opening views of natural or cultural surroundings
They generate social benefits that are equally accessible to all.	All parks are dedicated and open to the public, they are to become places of rest and recreation for visitors.
They play an important role in maintaining biodiversity, cultural diversity and the development of ecosystems.	All the parks in question use greenery characteristic of a given climate as well as a full or controlled natural succession is assumed in these areas.
They are most often introduced as large-scale solutions.	All of these projects are located in open landscapes or constitute a green enclave in urban development.
They help to achieve the economic benefits associated with the investment, while at the same time reconciling them with the future improvement and functioning of ecosystems.	The projects of the discussed parks already at the stage of implementation brought economic benefits - the implementations were carried out using recycled materials, were built on abandoned, unattractive and often polluted land of low market value. In the longer term, their development brings numerous ecological and environmental benefits.
They play an important role in shaping policies and other activities that lead to the achievement of specific objectives.	The discussed public parks were established in accordance with the decisions of the relevant authorities. Their creation improves the comfort of life in cities and eliminates the problem of abandoned post-industrial spaces.

In addition to environmental benefits of the Nature Based Solutions concept, these examples also include other positive natural, landscape (including views) or cultural phenomena related to the activities of the contemporary avant-garde of landscape architecture related to land art.

These include the following [19]:

- a) They constitute a form of artistic expression, a dialogue between the designer and the public;
- b) They can have symbolic values;
- c) They are used for sports and recreation;
- d) They constitute an acoustic barrier against the noise generated by cars and planes;
- e) They constitute a barrier against the pollution generated, for instance, by car fumes;
- f) They serve as landmarks;
- g) They can serve the role of vantage points;
- h) They can be used to mask and frame views;
- i) They make the terrain more diverse and attractive;
- j) They educate the society, making it more sensitive to new trends in art and design.

Scientists mentioned the phenomenon on many occasions but presented it in a very general light. Most scholars gloss over the subject and fail to analyse various concepts in detail. A study by Udo Weilacher [7] is an exception from this rule. However, due to its publication in 1995 and the fact it analyses only a small range of landscape architects, it is rather out of date. The concept is becoming increasingly popular among landscape architects and the public – such references to land art as building earthworks are perceived as attractive elements which

provide the parks with a unique character. Earth forms are not only recreational objects, but also key landmarks, facilitating orientation and movement around the city. In addition, when they form large-scale spatial compositions, their contrast with the surroundings is so distinct that each viewer can see that it is a work of art set in the landscape, which often carries an idea or message. At the same time in the concept of new parks, the use of natural materials, the idea of a dynamically developing and changing nature, as well as views connections - similarly to the land art, make nature become both the subject of the work and its background.

The whole phenomenon may be also compared to environmental art – the direction in contemporary art wherein the boundaries between life and art are blurred by "involving the viewer in the work of art itself" [20] – or, in certain cases, to the concept of ecovention, according to which artists try to reclaim lost parts of the city by transforming areas which have been destroyed, degraded and post-industrial areas into places where nature can once more flourish [21].

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