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The Setúbal Waterfront Polis Programme: Quantitative evaluation of the public space between 1900 and 2013

Programa Polis para a Frente Ribeirinha de Setúbal: Avaliação Quantitativa do Espaço Público de 1900 a 2013

Abstract

The modern conversion of cities waterfronts must take into consideration the urban design of the city, through a holistic vision of the territory. In the conversion process the public space is the fundamental element capable of integrating the “new city” with the existing urban fabric. An analysis of the public space of the Setúbal waterfront over the years is presented in this paper, with particular focus on the years following the execution of the Polis Programme. A quantitative approach was undertaken and the public spaces data was treated mathematically. This paper shows how the Polis programme contributed towards the increase of public space of the Setúbal waterfront and contributed for the conversion of those spaces according to the best European practices for the conversion of waterfronts. With the construction of new public spaces and the conversion of existing public spaces, the Polis programme contributed to a greater connection of the city of Setúbal with the river Sado and concretized a vision of integration of the waterfront that was present in the 1931 plan.

Resumo

As modernas reconversões das frentes ribeirinhas urbanas devem levar em consideração o desenho urbano existente da cidade através de uma visão holística do território. No processo de reconversão o espaço público é o elemento fundamental para a integração da “cidade nova” com o tecido urbano existente. Este artigo apresenta uma análise do espaço público da frente ribeirinha de Setúbal ao longo dos anos, com particular enfoque nos anos subsequentes à execução do programa Polis. Procedeu-se a um tratamento quantitativo matemático para análise do espaço público. Mostra-se como o programa Polis contribuiu para um aumento do espaço público da frente ribeirinha de Setúbal e para a requalificação desse mesmo espaço de acordo com as melhores práticas observadas em diversas frentes ribeirinhas Europeias. Com a construção de novos espaços públicos e com a requalificação dos espaços públicos existentes, o programa Polis contribuiu para uma maior conectividade da cidade de Setúbal com o rio Sado e concretiza a visão de integração da frente ribeirinha que se encontrava já presente no plano de 1931.

Keywords

urban design, waterfronts, public spaces, Setúbal

Palavras-chave

desenho urbano, frentes ribeirinhas, espaço público, Setúbal

The Setúbal Waterfront Polis Programme:

Quantitative evaluation of the public space between 1900 and 2013

1. Introduction

The modern conversion of cities' waterfronts must take into consideration the urban design of the city through a holistic vision of the territory. In the conversion process the public space is the fundamental element capable of integrating the "new city" with the existing urban fabric, unifying the two territories and allowing the conversion to expand into surrounding areas [1].

Over the XXth century Setúbal waterfront went through many changes, namely due to the changes in port activities (Setubal inland port hosts naval construction, cargo, ferry and passenger transport and fishing). These industrial port activities resulted in physical and functional degradation of the harbour areas that became abandoned over time. With this scenario during the '90s several urban intervention plans were devised to transform and modernise Setúbal waterfront.

This paper shows how the Polis programme contributed to the increase of the public space in the Setúbal waterfront. It also shows how it contributed to the qualification of run-down areas in the waterfront in similar ways to the conversions found in other European waterfronts. These transformations aimed to approach the city to the water. Examples of these transformative processes are seen in the cities of Barcelona and Lisbon [2,3].

An analysis of the public space of the Setúbal waterfront over the years is presented, with particular focus on the years following the execution of the Polis Programme. A quantitative approach was undertaken and the public spaces data was treated mathematically, in a methodology that followed the previous work of Sampayo [4], the work of Marat-Mendes et al [5] and the work of Sampayo and Rodrigues [6].

Using Setúbal as a case study, this paper highlights the process of public space transformation in the waterfront through: i) an analysis of the urban form of the Setúbal waterfront using the existing cartography and aerial photography (both past and present); and ii) a comparative assessment of the public space found in the cartography post 1900 against the reality and against the several proposals for the Setúbal waterfront. This analysis of the waterfront is divided in several steps:

i) **Archival research** (Administração dos Portos de Setúbal e Sesimbra, SA., Arquivo Distrital de Setúbal, Biblioteca Nacional de Portugal, Biblioteca Nacional de França, Câmara Municipal de Setúbal, Gabinete de Estudos Arqueológicos da Engenharia Militar, Instituto Geográfico do Exército, Museu da Cidade de Setúbal, Museu da Marinha e Torre do Tombo);

ii) **Vectorisation of Cartography Maps** (Table 1 depicts the selected nine case studies);

iii) **Cartography analysis**;

iv) **Data processing and analysis**.

1.1. Concepts

In this work the use of the term "public space" corresponds to the fraction of the open urban area that is not built and is of public usage [7]. The rationality behind the public space quantification follows that of Krier [8]. The following concepts were used:

- **Circulation spaces:** spaces of movement patterns of pedestrian and vehicular traffic.
- **Permanence spaces:** spaces whose main public usage is characterised by long stays like squares, "largos" and green spaces.
- **Square:** urban space with a regular geometric form, surrounded by similar building façades, usually containing public facilities.
- **"Largo":** space that resulted from expansion of an interstitial space presenting diverse geometric shapes and sizes.

- **Green space:** area occupied primarily by planted or to be planted vegetation, whose main function is leisure.
- **“Terrain Vague”** space: empty area without a defined border that isn’t characterised as public space [9].
- **Residual voids:** urban spaces without any defined function, belonging to the block area and that is not considered as public space.
- **Docks:** corresponds the junction of the riverbank areas with its built facilities and the water areas where boats are moored.

2. Quantitative Analysis of Public Space

2.1. Definition and quantification of public space

The quantitative analysis of the urban form was conducted based on the drawings of figures 5, 6, 7, 8, 9, 10, 11, 12, and 13. These drawings correspond to the selected cartography and were drawn according to the methodology cited. The measurements presented in this paper tables and charts should be read together with the drawings for a better perception of their similarities and differences.

The set of synthesis drawings were based on the cartography of the built features of Setúbal waterfront in 1900, 1947, 1967, 1989 and 2013 and also the development plans for the Setúbal water front of 1931, 1943, 1995 and 2004 (Table 1).

Table 1 - Selected cartography for the quantitative analysis of public space.

ID	Year	Name of the Cartography Map	Author	Archive
C1	1900	Drawing of the first Sado river embankment.	unknown	Museu da Cidade de Setúbal
P1	1931	Plan for the Setúbal harbour.	Eng. Afonso de Melo Cid Perestrelo	APSS
P2	1943	Setúbal map with the past constructions of 1941-1942 and the planned constructions for 1943.	Sociedade Industrial Setubalense	Biblioteca Nacional
C2	1947	Aerial photography of Setúbal.		Instituto Geográfico do Exército
C3	1967	Aerial photography of Setúbal.		Instituto Geográfico do Exército
C4	1989	Aerial photography of Setúbal.		Instituto Geográfico do Exército
P3	1995	Synthetic plan of the urban development plan for the Setúbal waterfront	Arch. António Meireles	APSS
P4	2004	Detailed plan for Polis	Arch. Nuno Lourenço (Studio RISCO)	Câmara Municipal de Setúbal
C5	2013	Aerial photography of Setúbal.		Google Earth

2.2. The expansion of the waterfront into the river

In order to understand the growth of the waterfront into the river Tables 2 and 3 present the implantation area of the embankment, the water area and the docks area present in the selected plans.

Tables 2 and 3 - Waterfront growth areas of the different cases of Setúbal.

	C1 (1900)	C2 (1947)	C3 (1967)	C4 (1989)	C5 (2013)		P1 (1931)	P2 (1943)	P3 (1995)	P4 (2004)
Total Area (River + Land Area)	261,5 ha	261,5 ha	261,5 ha	261,5 ha	261,5 ha	Total Area (River + Land Area)	261,5 ha	261,5 ha	261,5 ha	261,5 ha
Land Area	42,6 ha	70,4 ha	71,1 ha	71,2 ha	72,2 ha	Land Area	70,9 ha	71,8 ha	75,8 ha	72,3 ha
River	218,9 ha	191,1 ha	190,3 ha	190,3 ha	189,3 ha	River	190,6 ha	189,7 ha	185,7 ha	189,1 ha
Docks	3,4 ha	13,6 ha	14,1 ha	13,6 ha	17,1 ha	Docks	12,3 ha	13,3 ha	23,8 ha	17,8 ha

Tables 2 and 3 and the figures 5 and 13 show that between 1900 and 1931 there was a major land reclamation process by the construction of three docks. The waterfront in 1900 (C1) comprised 42,6 ha while in 1931 (P1) it comprised 70,9 ha. This represented an increase of 28,3 ha. Although the 1931 case is just a proposal, the land reclamation is clearly observed in the remaining cases where the land area is in the range 70-72 ha without suffering significant changes between 1931 and 2013. The exception to this is observed in the 1995 (P3) proposed plan, where 75,8 ha were defined for land area. This is due to the planning of a fourth dock west of the existing waterfront. This plan is therefore the case with the highest area of docks (23,9 ha).

2.3. Block Area

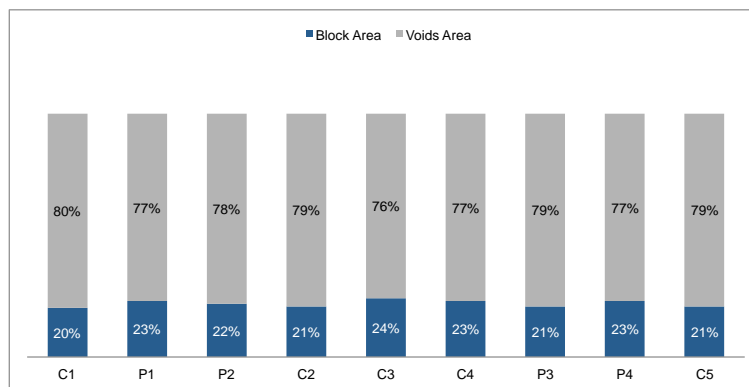


Figure 1 - Percentages of block area and voids area in Setúbal waterfront.

Figure 1 presents the ratios of the total block area and voids and it is clear from it that the 1900 (C1) case presents the highest ratio of voids (80%). Figure 5 also confirms these measurements visually.

The highest percentage of block area corresponds to 1967 (C3) with 24% of block area. This is mainly a consequence of the many existing fishing structures still in existence at the time.

The similarity of the ratios of the different cases also shows that 1931 (P1), 1989 (C4) and 2004 (P4) present the same block area: voids of 23:77 while for 1947 (C2), 1995 (P3) and 2013 (C5) that ratio is 21:79.

As the ratios are all close together 20:80-24:76 a detailed inspection of the public space is needed to extract the different qualities of the different cases, as suggested by Sampayo [4].

2.4. Public Space

As the block area and voids area ratio is very similar, a breakdown of the voids area of the waterfront is presented in Figure 2. In it the category “other elements” includes mountain area, “terrain vague”, residual voids, parking lots, and the docks area corresponding to the dock entrance embankments.

Figure 2 shows that plan 1 (1931) and plan 4 (2004), separated by 73 years, propose the highest percentage of public space (54%). Although the percentage is the same in both plans, by analysis of figures 6 and 12 respectively, the distribution differences of public space becomes clear.

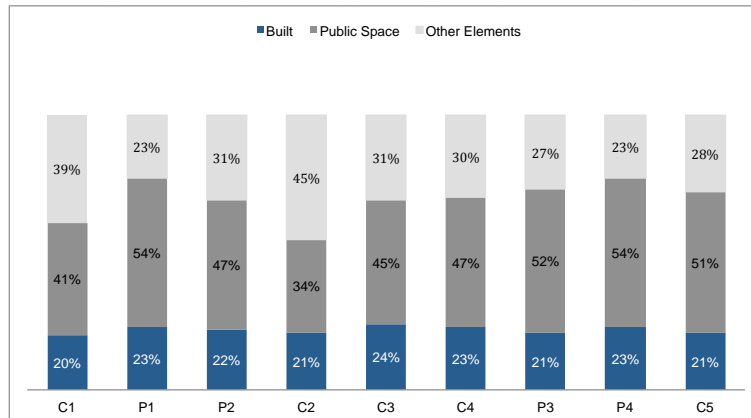


Figure 2 - Percentage of public space area, total block area and “other elements”

In the 1931 plan the circulation spaces are of highest importance in contrast to the permanence spaces. The latter is made of the Luísa Todi Avenue in the north limit of the plan and the remaining elements—one square, two “largos” and two green spaces—in the waterfront central zone. In the 2004 plan the circulation spaces are less important as the built area is also higher. This plan of the Polis also presents more permanence spaces along the Luísa Todi Avenue. It includes also a square in the North limit of the city and several green spaces and “largos” distributed along the waterfront.

The case of 1947 (C2) presents the lowest percentage of public space with only 34%. It also presents the highest percentage of “other elements” (45%). The drawing of this case in figure 3 shows a vast area (in orange) of undefined empty space, characterized as “Terrain Vague”. It is also observed that the plans usually present higher areas of public spaces. This fact demonstrates the attention given to the definition of public spaces reducing the area of “Terrain Vague” by the promoters of those plans. In any case it is also possible to observe that the highest percentage of proposed public space (54% in plan P1 of 1931) was almost achieved many years later in 2013 (C5 with 51% of public space).

The values of public space obtained both in the proposals and the constructed cases (between 34% and 54%) are in their majority higher than the ranges of public space established by Krier [8] as optimal. Kier defined a model pattern for the quantification of public space where the optimal range of public space is in the interval 25%-35% [8]. These percentages correspond to a kind of urban design that is different from that of the Setúbal waterfront—and analogously different from other waterfronts—where there are vast public space areas opening into the river.

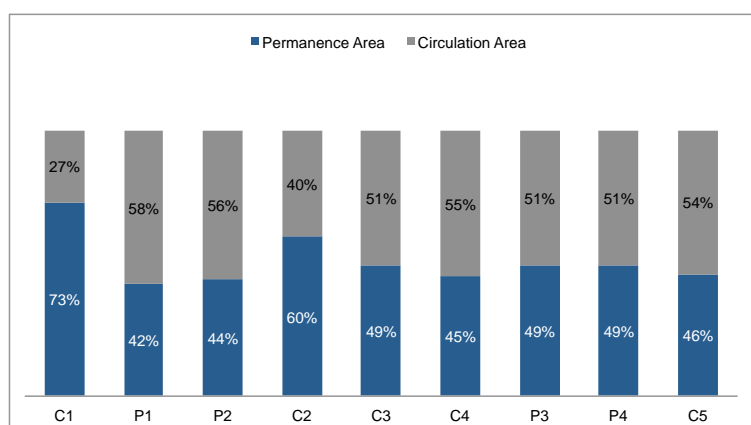


Figure 3 - Breakdown of the public space into permanence area and circulation area.

Figure 3 shows the ratios of permanence area and circulation area of the several studied cases. The Luísa Todi Avenue was considered as a permanence space due to its recreational character that is more important than the circulation that it also presents.

It is clearly observed in Figure 3 that the 1900 (C1) case shows the highest percentage of permanence space (73%) and consequently the lowest value of circulation spaces (27%) over all the analysed cases. The inspection of the 1900 drawing (Figure 5) reveals that Luísa Todi Avenue

contributes significantly to this permanence area. Also the lower value of circulation area is due to the fact that there is a high area of “Terrain Vague”.

The drawings show that the permanence area in 1900 (C1) is made of the Luísa Todi avenue and one square—both also present in the remaining eight cases studied—and three “largos” located near the avenue. The remaining eight cases show higher permanence area values because in addition to the avenue and square—that represent most of the permanence area—several green spaces have been introduced. All the case studies except the 1900 (C1) show a permanence area in the range 42%-60% while the circulation area in the range 40%-58%.

The 1931 plan (P1) presents the highest percentage of circulation area (58%). Base on the drawing of this plan, it is observable the reduced number of permanence spaces and the very wide streets in many locations of the waterfront.

The drawings also reveal a dramatic difference in the circulation area between 1900 (C1) and the remaining cases. The main reason for this difference corresponds with the advance of the waterfront onto the water by land reclamation processes.

It is possible to group the 1967 (C3), 1995 (P3) and 2004 (P4) cases because they present the same percentages of permanence area (49%) and circulation area (51%). The figures 9, 11, and 12 reveal on the other hand that these same percentages are defined differently when doing a local detailed analysis. In 1967 only four permanence spaces are defined: the avenue, the square and two green spaces near the river. In the other two proposals, both present more permanence spaces. The 1995 defined nine permanence spaces while the 2004 plan defined eleven.

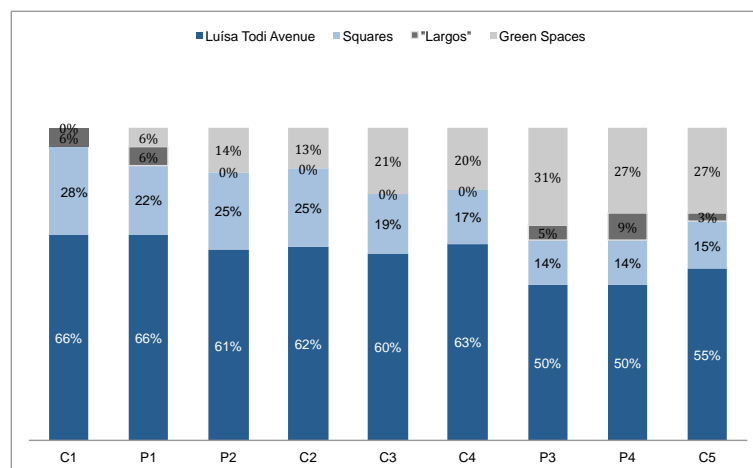


Figure 4 - The structure of the permanence spaces

Figure 4 shows the structure of the permanence spaces of the different case studies. It is clear that the majority of the area in all plans is defined by the Luísa Todi avenue.

In the case of squares, only one is observed in all studied cases, but as observed in Figure 4 the percentage of the area occupied by this square diminishes over time. In 1900 (C1) it corresponds to 28% of the permanence space and in 2013 it is reduced to only 15%. The drawings of these cases show that this diminishing of the square area is due to appearance of new buildings in that space.

The percentage of “Largos” is very residual, varying from inexistent to 9% of the permanence spaces. The Polis plan (P4) is the case presenting the highest area of “Largos”, equivalent to 18,0 ha. The cases of 1943 (P2), 1947 (C2), 1967 (C3) and 1989 (C4) don’t have any “Largos”.

The Green spaces area increases over the years reaching the highest percentage of 31% in the 1995 (P3) proposal. While in the 1900 case there was no defined green space, the 1995 (P3) 31% of green spaces corresponds to almost 62 ha. It is important to notice from the drawings that all these green spaces are located in the south limit of the Setúbal waterfront.

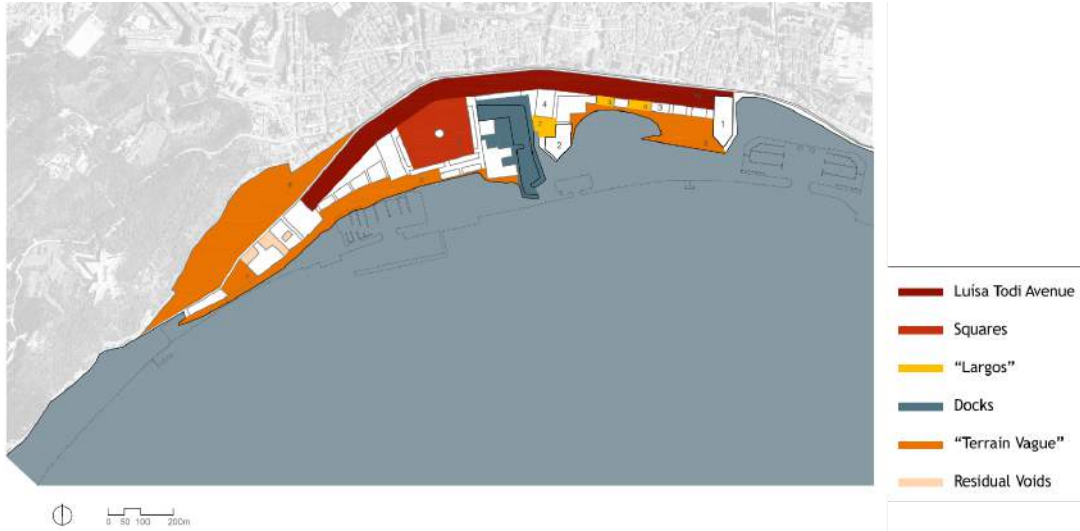


Figura 5: C1 - 1900 - drawing of the first Sado river embankment (Source: Museu da Cidade)



Figura 6: P1 -1931 - plan for the Setúbal harbour (Source: APSS)



Figura 7: P2 - 1943 - Setúbal map with the past constructions of 1941-1942 and the planned constructions for 1943 (Source: Biblioteca Nacional)



Figura 8: C2 - 1947 - aerial photograph of Setúbal (Source: Instituto Geográfico do Exército)



Figura 9: C3 - 1967 - aerial photograph of Setúbal (Source: Instituto Geográfico do Exército)



Figura 10: C4 - 1989 - aerial photograph of Setúbal (Source: Instituto Geográfico do Exército)



Figura 11: P3 - 1995 - Synthetic plan of the urban development plan for the Setúbal waterfront (SOURCE: APSS)



Figura 12: P4 - 2004 - Detailed plan for Polis (SOURCE: CMS)



Figura 13: C5 - 2013 - present day aerial photography of Setúbal (SOURCE: Google Earth)

3. Conclusion

In this paper it was shown that the Polis programme contributed towards the increase of public space of the Setúbal waterfront and contributed for the conversion of those spaces according to the best European practices for the conversion of waterfronts.

The cases of 1931 (P1), 1989 (C4) and 2004 (P4) present a *block area / void area* ratio of 23%:77% (Figure 1). This equality across decades and case studies confirms previous observations by Sampayo [4] that many urban designs are constrained by geographic features and that those geographic features drive the process of defining new spaces at a macro scale of the city.

The plans of 1931, 1943, 1995 and 2004 include higher percentages of public space, contrary to what was observed in the constructed surveys of 1900, 1947, 1967, 1989, and 2013, that present lower percentages of public space. This shows what seems to be an undervaluation of the importance of public space when the construction phase of the plans starts. This can be explained by the fact that the private promoters usually perceive public space as low value areas. In any case there was a progressive increase in the public space are constructed over the years. This increase resulted from the implementation of some of the public space proposals present in the several plans, mainly from the execution of the Polis programme.

It was shown that the four plans have higher percentages of public space when compared with the constructed and that are not many variations of the values. An example of this is that the plans of 1931 and 2004 present the same public space percentage (54%). This equality at the macro level does not give us a detailed view of the differences between the different plans. By looking into how the public space of these two plans is made of it is possible to realise that the 1931 plan public space has 58% of circulation spaces and 42% of permanence. On the other hand the Polis programme public space (2004) presents less circulation space (51%) and more permanence space (49%). This is a consequence of the introduction of more permanence spaces along the waterfront in the latter plan.

Even in the cases where the middle level analysis reveals similar permanence areas and similar circulation areas – cases of 1967 (C3), 1995 (P3) and 2004 (P4) with 49% and 51% respectively – the detailed analysis of figures 9, 11, and 12 reveals that they are defined differently in each case. In the case of 1967 there are only four permanence spaces: the Luísa Todi avenue, the square and two green spaces in the near the river. On the other hand the 1995 and 2004 plans add another five and seven permanence spaces, respectively. The specificity of the space depends on the level of resolution at which the public space elements are being composed. This also implies that the urban public space also depends on the way these elements articulate with each other at different levels.

With the construction of new public spaces and the conversion of existing public spaces, the Polis programme contributed to a greater connection of the city of Setúbal with the river Sado and concretized a vision of integration of the waterfront that was present in the 1931 plan.

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