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Urban waterfront areas: Environmental planning of small-scale harbour zones and consecutive urban waterfront areas

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Abstract

The subject of the study concerns the regeneration of the urban waterfront, within the framework of a new approach for the quality living of the coastal human communities, not only under the terms of developmental perspectives, but also in satisfaction of a general need for the integration of natural spaces in the urban fabric, under the consideration to redefine the modern identity of the coastal front, within the framework of the environmental approach of the space and at the level of landscape aesthetics.

More specifically, we focus on the urban waterfront and the small-scale harbours of the Greek island cities, which have maintained a different character up to this day, connected with the vital needs of island areas, due to their geographical inconsistency, their limitations in natural, productive and financial resources, as well as the special relationship of their inhabitants with the sea.

Keywords: environmental planning; coastal city; harbour; urban waterfront; landscape design

1. INTRODUCTION

1.1. The goals of this study

This paper examines the sustainable site design approaches of the modern urban coastal zone, with the aim of restoring the relationship of humans with the water element and its natural parameters. As representative of the urban waterfront and the small-scale harbours of the Greek island cities, we refer to the redevelopment that concerns the waterfront areas of Karlovasi of Samos and, more specifically, the land harbour zone and the consecutive waterfront area.

The main purposes of this paper are to serve as a guide for the future developments at the seafronts through sustainable site design practices, to articulate an enhanced vision and prototype for sustainable urban seafront, to define the process of presenting design proposals through and to identify basic principles of site design to guide improvement of design developments.

The outcomes of this study attempt to present ingredients for sustainability of future designs and illustrate a useful tool during the collaboration and discussion.

1.2. The coastal zone & the human presence

The coastal zone is a particularly sensitive space due to a dynamic balance between the land and the sea [1], as it is formed and differentiated by the local natural parameters of each region. These conditions provide to the coastal zone a character of eternal movement and variability, which compose a natural space with great ecological value and a landscape with special natural beauty. At the same time, the coastal zone is an area with particular anthropogenic values at multiple levels, which concern basic and non-basic human needs.

The historical progress of the human presence in the coastal space is marked by the gradual transfer (as in other natural areas) from the harmonious co-existence to dominance, during which the coastal zone is transformed into a development zone of more and more anthropogenic uses and activities, maintaining less and less of its natural features. However, at the same time, the timeless

relationship of man with the sea has given the coastal zone a special historical and cultural heritage, which continues to form the identity and character of coastal cities [2].

The modern evolution of human dominance over the coastal zone is marked by the excessive exploitation of the coastal space through a continuous development and conflict of multiple uses, maintaining important financial, social and economical aspects, within the framework of an unequal competition between the anthropogenic and natural environment. These conditions lead not only to the great degradation of the coastal natural space and its inherent features, but also to the alienation of man from the coastal zone and the loss of the default relationship of the coastal communities with the sea element.

1.3. The harbour & the urban waterfront

The harbour facilities, connected in citizen's mind with pollution and degradation, in combination with their 'rough' interventional character to the sensitive balance of the coastal zone, as well as their rough morphology in contrast to the urban fabric and the coastal landscape [3], are treated as "negatively laid out" spaces to the city they serve. These conditions, in combination (in many cases) to the autonomous development of the harbour as a space with particular functions, or to the continuous competition between the harbour and the city for coastal space, often create spatial and mental gaps between the city and the harbour [4], intensifying, among others, the alienation of the urban daily life from the coastal front.

The modern transformation of the living and development trends with criteria of maintenance and protection of the cultural heritage and the natural environment rediscovers (among others) the values of the coastal waterfront and, in general, of the water element, seeking the reconnection of the urban life with the coastal space and landscape [5]. Under these circumstances, the positive contribution of harbours is recognised, not only as a driving force for development and financial progress, but also as historical portals for the exchange of knowledge and culture, within the framework of their integration as a functional and integral part of the urban waterfront and the city.

1.4. The specificities of the small-scale harbours of the Greek island areas

In Greece, the sea and the relationship of people with the water element have been determinant factors since antiquity for the development of the social, cultural and economical structure of the anthropogenic environment, given a special geographic morphology, where the land is not imposed upon the sea, but the sea is imposed upon the land.

Particularly in the island areas of the country, people's life is interwoven with the sea element, as the coastal zone, in most cases, is the vital space of their living. This traditional relationship with the sea has given the harbour of these areas a particular character, which is summarised in the following points:

- The geographic discontinuity and peripherality (not only regarding the European Union, but also the Greek mainland) of the island areas, the limited variety and amount of their natural resources, as well as their limited carrying capacity, from a natural, social and financial aspect, create dependences on the mainland of the country [6]. Therefore, the harbour network, the sufficiency of the harbour infrastructures, as well as the sea transports, having in mind the objective needs and not the profit, play a fundamental role for the maintenance of the socio-economic coherence, the viability and the inter-culturalism of the island areas of the country [7].
- In many cases, the sea transports are crucial not only for supply and transport, but also for health. Therefore, the harbours in island areas constitute not only a means of viability and development, but also an essential means of survival.
- The area of the island harbour often constitutes a multi-used area, which serves as an integral and vital part of the urban fabric, hosting activities connected with the local and traditional relationship of the residents with the sea (for example, fish markets, outdoor events, walks with views to the sea), integrating the spaces of the harbour into the daily life of the town.
- At the same time, the island harbours maintain an additional aspect, as, beyond others, they also constitute tourist portals, the functional, environmental and, if possible, the aesthetic quality of

which plays a crucial role, given that, in combination with the rest urban waterfront, they constitute the externalisation of the town's image to its visitors.

- Despite its rough and greatly interventional character, the harbour constitutes a point of reference of the small island town, one of the typical and recognisable spaces, often with particularly historical character, as well as with strong experiential and emotional connections with the islanders.

The modern technological development of transports and the subsequent need for bigger and more complete harbour infrastructures within the framework of the developmental prospects of the island areas, under the form of a typical and impersonal structure of the harbour spaces, undermines the identity of the small-scale island harbours, creating incompatibilities in their mixed character, as well as in the relationship of the town with the harbour and the sea element.

1.5. The regeneration of the urban coastal zone

Within the framework of the quest for modern developmental prospects and under the conditions of a new approach regarding the quality of the urban environment, the coastal cities must redefine their relationship with their coastal front, seeking the reconnection of the urban life with the water element [8]. The coastal urban spaces, maintaining the advantage of the open front, the unobstructed view, as well as the aesthetics of the coastal landscape, constitute the spatial base for the designation and recognition of the water as a natural resource which claims a new urban quality.

The over time evolution of planning and redevelopment approach of the coastal areas [9], as well as their per case typology [5], testify the constant search of the identity of the urban coastal zone, as an area with great anthropogenic and natural value. Within the framework of a sustainable approach, the identity of the urban waterfront is revealed through the environmental and bio-climatic adjustment of the form and the materials, placing the anthropogenic structures under the 'dominance' of the coastal zone's natural aspect.

In the Greek coastal cities (and particularly the coastal residential cores of the island areas), the identity of the coastal waterfront is marked by its historical and traditional relationship with the core of the town, maintaining similar features (density, structure, uses) [8]. Therefore, the regeneration of the Greek urban coastal area must serve (among others) the maintenance of the strong bonds of the town with water.

A general framework for the approach of the urban waterfront with the aim of sustainable development of the coastal cities is formed through the 'ten principles' as they were approved during the international conference on the urban future (URBAN 21, Berlin 2000) and during the international fair EXPO 2000 (Wasserstadt GmbH & 'Centre Cities on Water'). In summary, these principles refer to the ensuring of the water and environment quality, the recognition of the historical character of the urban coastal front and its consideration as an integral part of the city, the need for mixed use and free access, the collaboration of the stakeholders with the concurrent participation of the public, the flexible and detailed approach through long-term plans and evolving procedures, as well as the participation of the city in an international network of knowledge and experience exchange at all levels [5].

However, at the same time, the risks lurking during the planning of the urban waterfront, as it is defined as a modern means of development and rejuvenation of the coastal cities, must be pointed out. The main risks concern the development of incompatible uses, the creation of overly entertaining-tourist places [10] or one-dimensional activities [8], as well as the excessive 'merchandising' of the area, which leads to the further increasing of the already great financial value of the coastal estates. These conditions either lead to the degradation of the urban coastal space or make the urban waterfront an area for specific parts of the population and enterprises. In any case, the standardisation of the interventions [5] and the treatment of the urban coastal zone as panacea for the residential development and stoutness of the coastal city [10], undermine the character and specificities of not only the coastal space, but also the consecutive urban fabric.

2. THE BACKGROUND: CASES OF REGENERATION & PLANNING OF COASTAL AREAS

2.1. The tourist port of Imperia city

The regeneration of the historic port of Porto Maurizio in the coastal city of Imperia (Liguria, Italy) was performed with the aim of enhancing the tourist activity of the city. A characteristic element of the study, carried out by architecture Morasso [11], is the harmonious co-existence of the port activities with uses, activities and structures that function as continuation and expansion of the city (unobstructed movement of pedestrians and bikes, presence and layout of green in all spaces, integration of commercial uses, as well as places of entertainment and residence) (Figures 1, 2, 4, [12]). The symbolic references are particularly interesting, with the creation of a 'sea boulevard' leading to the 'sea hall', surrounded by nautical sails, elements that serve at the same time as landmarks (Figures 2, 3, [11] & [12]). Furthermore, there must be pointed out the use of green roofs and solar collectors (Figure 4 [11] & [12]), as well as the re-use of existing building infrastructures for the housing of cultural activities.



Figures 1, 2, 3, 4: Spaces for pedestrians, 'sea boulevard', 'sea hall', layout of buildings & green, usage of green roof & solar collectors

2.2. Creation and planning of land spaces north of the old Mykonos port

This case was selected in order to point out cases where new infrastructures are necessary, but there is no available space for it. As a result, dilemmas are created, regarding the hierarchy of the priorities.

Mykonos is a Greek island that depends mainly on tourism, while the maintenance of its traditional architecture, as it 'rises' through its rocky surface, constitutes an element that gives a special identity. The trends of degradation and alteration of the traditional fishing port and the consecutive residential fabric of Mykonos town, due to lack of space for the intense mobility of vehicles and the parking needs [13], led to choices that inevitably required the definition of priorities.



Figures 5, 6: General layout of the new land spaces north of the traditional Mykonos port

With the creation of new land spaces north of the traditional harbour and the siting of functions that will serve the harbour and Mykonos town (passenger port station, parking spaces, fishing harbour) [14] (Figures 5, 6, [15] & [16]), on the one hand, extended natural sea space was spent through the performance of silting, but, on the other hand, the alteration of the traditional settlement and the old port was avoided, giving priority to the cultural identity of the place. This element is evident from the care for the layout of the space with structures and materials that harmoniously

connect the new infrastructures with the natural environment and the traditional settlement of Mykonos.

2.3. The coastal outdoor space in the Tel Aviv harbour

The regeneration of the outdoor coastal area in the old harbour of Tel Aviv (Israel) by ‘Mayslits Kassif Architects’ in cooperation with the architect Galila Yavin constitutes the creation of an outdoor space with irregular, non-hierarchical structures (wooden wavy surface, seats that look like pebbles, lights that remind of sparse reeds) [17], so successful in the symbolic representation of the previous natural coastal landscape of the area and the organic variability of the coastal space over time, that any attempt to describe them will fail, as Figures speak louder than words (Figures 7, 8, 9, [18]). This case proves how successful the simplicity of design can be during the regeneration of the coastal area.



Figures 7, 8, 9: Wooden curved surface & equipment pattern

2.4. The regeneration of the urban waterfront in the city of Cleveleys

The regeneration of the coastal urban zone in the city of Cleveleys (Lancashire, England) (collaboration of the company Birse Coastal Limited, the District Council of Wyre and the artist Stephen Broadbent) combines the protection of the coastal front from the floods of the area with the creation of a sculptural gradual pattern of wave, which serves as an outdoor space that connects the city with the shore [19] (Figures 10, 11, [19] & [20]). The gradual front limits the sense of the height difference, which is necessary for the protection from floods, avoiding the construction of vertical walls that obstructed the view and the access to the sea (Figure 10, [19]) [21].



Figures 10, 11: The coastal front after the completion of the project

The use of materials and green planting resistant to the coastal environment, as well as the aesthetics of the structure and the urban equipment, complete the quality and the impressive image of the city waterfront. Also, there must be noted the active participation of the public in all study and implementation phases of the project, as well the care of the University of Lancaster for the monitoring the effects of the project, through a system of cameras that receive hourly digital images of the shore [21].

3. REGENERATION OF THE HARBOUR ZONE & THE CONSECUTIVE COASTAL AREA IN KARLOVASI OF SAMOS

Karlovasi is located in the northern-western part of the island of Samos. It is an island town that experienced economic prosperity from 1877 until the end of the 19th century, with the development

of the leather industry [22]. During this period, most of the infrastructure projects of the town were performed, among which the harbour (1871-1903), which was built to cover the needs of the commercial and industrial activities of the town [22]. The coastal road connected the harbour with the coastal industrial area and constituted a vital part of the town, with horse-drawn tram and neighbourhoods with buildings of various uses (residences, stores, warehouses, factories), despite the constant needs for its maintenance, due to the heavy weather conditions of the northern front (Kogias, 2000). The following decline of the industrial activities lead to economic depression and the gradual abandonment of the coastal zone, with the exception of the harbour, which continued to be an integral part of the town, for entertainment and commercial uses.

The establishment of the University (1987) and the following development of tourist activities constituted an opportunity for a new economic growth of the town. Within the framework of the new developmental prospects and in combination with the modern needs of sufficiency of the harbour infrastructures, it was deemed necessary to expand the harbour and create a tourist mooring. The new facilities were constructed in an area that until then had been a beach, caring only for the basic operational structures, which, in combination with an extended access road construction, created an ‘impersonal’ environment, which was suffocating for the all ready existing neighbouring buildings (residences and entertainment places) (Figure 12, [23]). These conditions, in combination with the lack of spatial organisation of the old commercial, passenger and fishing harbour (unseparated operational spaces, unorganised parking and flows of vehicles/pedestrians), created conditions of undermining of the traditional mixed character of the harbour and its ‘organic’ relationship with the town. The parallel regeneration of outdoor spaces in the internal part of the town enhanced the trends of alienation of the port from the daily life of the residents.

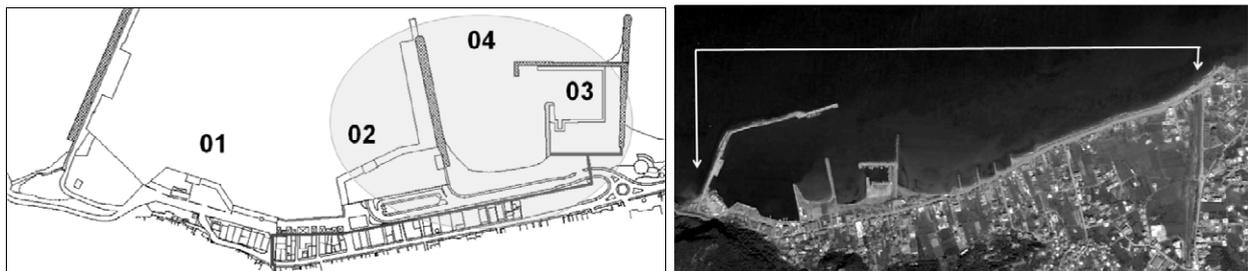


Figure 12: The new harbour facilities & the boundaries of the harbour zone:

01. The old harbour 02. The new harbour 03. The tourist mooring 04. Former beach

Figure 13: The study area

The regeneration of the harbour zone and the consecutive waterfront area of Karlovasi (Figure 13, [24]), as a typical case of the aforementioned analysis, concerns the restoration of the pre-existing relationship of the island town with its coastal front, as well as the traditional character of its harbour. The planning parameters are formed by the theoretical and practical scientific experience to this day, within the framework of a sustainable approach and the environmental consideration of the area, in combination with the historical character and the cultural heritage of the place.

Attempting a short reference to the regeneration study, we can mention the following: initially, it was deemed necessary to delimitate the spaces that are strictly needed for harbour activities, for safety and functionality reasons, with low fencing made of local materials (wood, stone), in order to ensure the intimacy of the place and to avoid the filling of preventing the view to the sea. Also it was deemed necessary to separate the traffic flows of vehicles and pedestrians, with coatings of different colours at the same level, so that the feeling of smooth traffic can be created (with the appropriate signs). The unorganised parking is treated with the creation of bike and vehicle parking spaces (in the harbour area and along the coastal road). With the use of minibuses, the traffic of vehicles and the necessary size of the parking spaces is restricted.

The use of paving blocks with cold material's technology (of light colours) in replacement of the asphalt and the placement of paving blocks of natural stone on pressed sand (water permeable

coating) to the vertical pedestrian areas that lead to the harbour spaces, as well as the use of wooden surfaces in the reception spaces for small vessels, on the one hand, serves the improvement of the bio-climatic conditions and the aesthetics of the place and, on the other hand, gives part of the historical character of the port, which was built in whole of stone.

In the western part of the old harbour (Figure 14), north of the refugee district, a space of green is created, which serves as a protection ‘filter’ from the port traffic. Also, in the elevated space west of the small vessels’ shipbuilding zone (Figure 14) wooden traditional vessels are placed, so that they can be seen from the sidewalk of the uphill road, as witnesses of the traditional shipbuilding activity of the area.

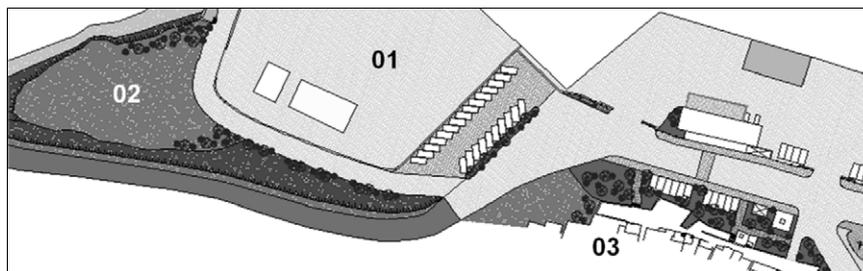


Figure 14: Western part of the old harbour:

01. Shipbuilding zone 02. Space of placement of wooden vessels 03. Refugee district



Figure 15: Eastern part of the old harbour:

01. Metallic construction with water flow 02. Warehouses
03. Buildings with recreational uses 04. Space of outdoor exhibitions

Figure 16: Metallic construction with water flow

In the eastern part of the old harbour (Figure 15), it was deemed necessary to demolish an old prefab, west of the old warehouses. At the same place a metallic construction with water flow is proposed, with mosaic coating and green planting (Figures 15, 16, [25]). On the facade of the warehouses, an outdoor transitional and passing space was created, with green planting and outdoor seats, while part of the warehouses is proposed to be re-used for cultural activities (Figure 15). Outdoor seats of the same layout are also placed in the north, in the area where small vessels will be placed (Figure 15). In front of the buildings with recreational uses, it is proposed to place uniform wooden shelters covered with fabric and fibre glass, in replacement of the current ones (Figure 15). Finally, in the eastern end of the old harbour, an outdoor exhibition space is created, with linear green in curved layout and a central passing aisle, shaded in whole with sails, at the same time serving as a connecting and transitional space between the old and the new harbour (Figure 15).

In the area of the new harbour (Figure 17), it is proposed to create a building for the reception and transition from and to the new harbour infrastructures (with architectural features that refer to historical buildings of the town), with an inner ‘yard’ (roofed central space with skylights and vents) and a green roof (Figures 17, 19). Furthermore, the restriction of the extended new road construction to the absolutely necessary dimensions provides space for the creation of a pedestrian area as a transitional space between the harbour infrastructures and the existing buildings, while the green planting (as in the whole study area) serves not only as a bio-climatic factor, but also as a

means of delimitation (Figure 17). Also, it is proposed to create an outdoor cinema in the yard of the ‘Provataris’ building and to re-use the ‘Akteon’ hotel (one of the oldest hotels of the town) as cheap accommodation for young people, within the framework of the University activities (Figure 17).

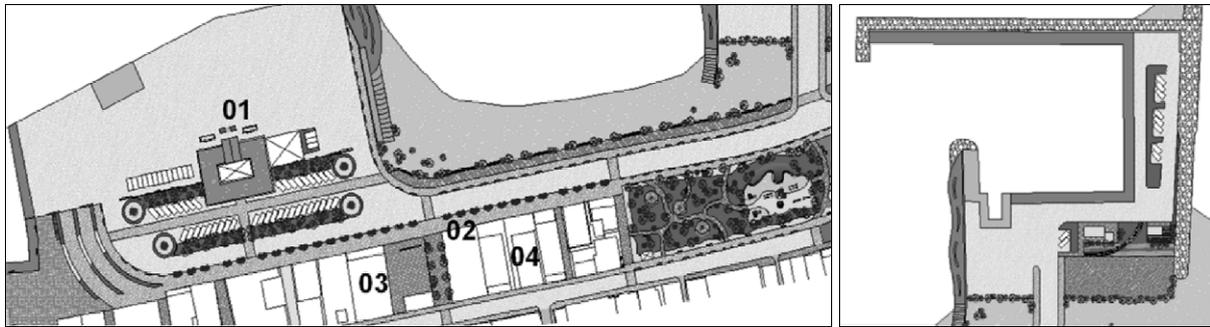


Figure 17: New harbour:

01. New harbour building 02. Pedestrian area 03. ‘Provataris’ building 04. ‘Akteon’ building

Figure 18: Tourist mooring

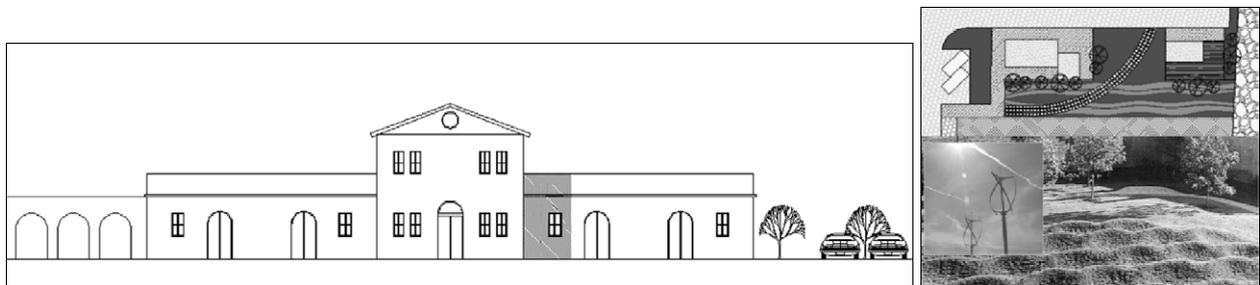


Figure 19: New harbour building

Figures 20, 21: Buildings of tourist mooring & green area

The creation of the tourist mooring (Figure 18) (beyond the use of paving blocks with cold material’s technology as those of the harbour and the creation of parking areas) concerns the siting of an administration building and a refectory with green roof and yards with paving blocks of natural stone (water permeable coating), as well as the creation of a green space with wavy surface, where small wind generators are placed along the passing path (Figures 20, 21, [26]). The southern end of the tourist mooring zone is delimited with tree planting, creating spaces of boat placement (Figure 18), while the remaining shore between the harbour and tourist mooring infrastructures is maintained as a space for walking and viewing to the sea (Figure 17).



Figure 22: Green area



Figure 23: Playground wall

North of the tourist mooring, an extended green area is created (Figure 22), the biggest part of which will be covered by low perimeter vegetation followed by taller plants (bushes and trees). Also, paths with compacted soil and circular squares with flower gardens and semi-circular pergolas are created (Figure 22). In the central part of the park, a playground is created, with a characteristic curved and uneven climbing wall (Figures 22, 23, [27]), which protects from the winter northern winds. The northern-western part is covered with wooden floor, with circular spaces with sand and seats like pebbles. Also, the southern-western part, which is separated from the north with sand areas and long and narrow water canals, is formed with low vegetation and uneven islets with local aromatic plants (Figure 22).

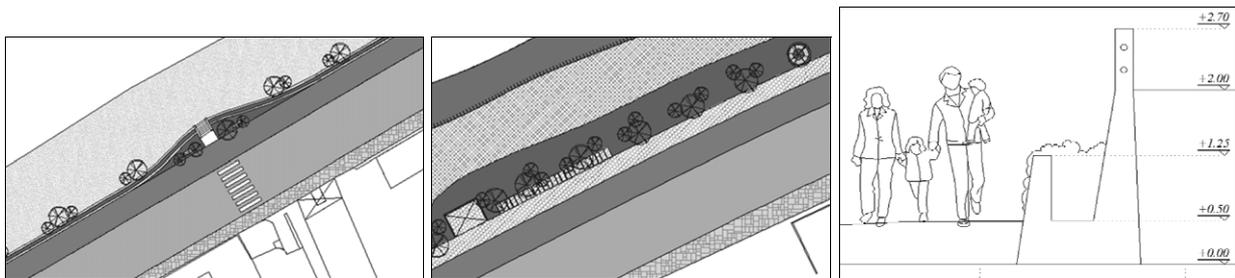


Figure 24: (a) The area where the vertical breakwaters were

Figure 25: (b) The rest of the coastal road

Figure 26: Stone wall of the coastal road

In the coastal road (Figures 24, 25), given the application of an existing coastal engineering study (removal of vertical breakwaters due to failure, construction of parallel water-level breakwaters and recovery of the beach, [28]), the construction of a two-way bike lane is proposed, with distinct path until the new harbour building (red slip-resistant asphalt pavement and, after, at the remaining shore, compacted soil delimited with tree planting) (Figure 17). Also it is proposed: (a) the shaping of widenings with green, outdoor seats and stairs that access the beach at the points where the vertical breakwaters were (Figure 24) and (b) the creation of green areas, outdoor seats and pavement in the remaining front of the coastal road (Figure 25). The vertical front of the road in the area where the vertical breakwaters were, is formed with stone wall and green planting (Figure 26). The recovery of the previously existing beach along the coastal road and its gentle configuration (wooden changing rooms and aisles, shade zones with appropriate tree planting) ‘indemnifies’ the area concerning the loss of the areas that were beaches.

It must be noted that the green areas consist of plants that thrive in the wider area and can survive in the coastal environment. The use of solar collectors and wind generators serves the saving of energy, while the collection/recycling of waste and the re-use of water are integrated in a wider network that concerns the whole town.

4. CONCLUSIONS

The conclusions of the aforementioned theoretical and practical analysis concern:

- The contradictory character of the coastal zone, as an area with natural and anthropogenic values, the blending of which is a constant and derivative procedure, aiming at the balance between the natural and the anthropogenic environment.
- The fact that the parameters of a sustainable approach serve not only the human presence in the urban coastal zone, but also the respect to the natural coastal landscape, the inherent features and its carrying capacity.
- The recognition of the urban waterfront as an integral part of the coastal city, which must serve not only the transition from the urban fabric to the natural coastal space, but also from the land to the sea. The small-scale harbours of the Greek island areas, due to their specific character, can, among others, fulfill this condition.

- The fact that the traditional character of the urban waterfront concerning the uses and activities that have balanced in the past not only with each other, but also with the natural features of the coastal zone, is an important and relatively stable planning parameter, compared with the variability conditions of the coastal areas, as they arise from their natural essence and their modern developmental character.
- The value of simplicity in design, which can be more successful than impressive and complicated interventions.
- The possibility to achieve a successful blending that will combine safety, aesthetics and directness during the regeneration of the urban waterfront.

The proposed of the landscape design project is to integrate the sustainable site design approaches that have been part of plans that have been strongly orientated toward improving the natural environment. For sustainability purposes and ecological validity, this landscape design case engaged the natural environment and ecological values have been given special emphasis.

A goal of the design is to improve the quality of open space by enhancing the landscape with emphasis on the improvement of the connection between people and the natural landscape with the implementation of landscape principles.

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