Sustainable Urban Design Strategies for Island Settlements
The Case of Burgazada (Princes' Islands, Istanbul)

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1. Introduction

Throughout the urban development process, settlements grow and spread depending on many conditions, particularly of the physical structure. Although being a small part of a large urban fabric; the development process of an island settlement is much more specific due to the morphological structure and introverted spatial configurations. The growth and development process on a large scale may affect island settlements directly or indirectly, even if they seem independent from the mainland. In this context, the need for sustainable urban design strategies and practices raise as a necessity for preserving the identity and the characteristics of the islands. This paper emphasizes the need and importance of sustainable development from a conceptual perspective. The case area, Burgazada, is a typical island settlement with modest characteristics, but it's facing with the danger of the rapid growth process of Istanbul indirectly for a time. Within the framework of the study, a conceptual methodology called "placemaking theory" has been tested and visions and strategies for sustainable development have been conceptually determined for short, medium and long terms.

2. Historical Evolution of Burgazada

Burgazada is the third largest island of the Marmara Island Group, which is a chain of nine islands in total and also named "Princes' Islands" located at the south-eastern side of Istanbul (Figure 1). Princes' Islands are registered as natural heritage in 1976. All of the islands are pedestrian-oriented and closed to traffic, so the only access to the islands is by sea transportation. The islands are located just across the higher density settlements of the Anatolian side of the Istanbul, which are Kartal, Maltepe and Bostancı. The patterns of each side compose a great contrast when looked comparatively; while islands have modest, lower density and self-developed urban fabric, the development of the other settlements is rapid, higher density and concentric, in relation with the functional identity.

Burgazada's historical process goes back to the pre-Byzantine period. "Panormos" and "Antigoni" were the former names of the island. In the time of Turks, its name has changed to Burgaz (Prygos, Pirgos), which means "donjon – tower of a castle". In Byzantine period, there were fisherman huts, monasteries and gardens on the island. Also in Ottoman period, Burgazada was an important place for Greek fishermen. During all the historical periods; the island has been a composite place where people from different ethnic origins live together. So, the physical environment has also effected from the ethnic diversity.

At the beginning of 19th century, Burgazada was known as a summer resort like other islands. After the enhancement of the ferry trips, the island became a permanent residential area. The buildings on the island have a unique architectural style, mostly wooden and traditional materials used in earlier times. Up today, orientation of the houses was formed with respect to each other and the urban pattern developed with consideration of human scale. Shores, bays and forests are the other attractive attributes for all periods of process.

The construction of electricity and sewege systems and asphalt roads between 1935-55 was an important milestone for development process. The urban fabric enlarged through the natural thresholds and urban sprawl also evolved organically. The final and the existing form of the urban fabric was linear along the northern and eastern coasts (Figure 1). The physical environment was started to damage after the abondenment of Non-Muslim communities during 20th century. Also the fashion of multi-storey buildings leaped to the islands in 1950, so the unique architectural style has been corrupted and the most of the wooden houses were demolished. The natural rocky structure of the shoreline was also modified in 1986-87. Finally, the fire disaster in the forest destructed the natural heritage in 2003.

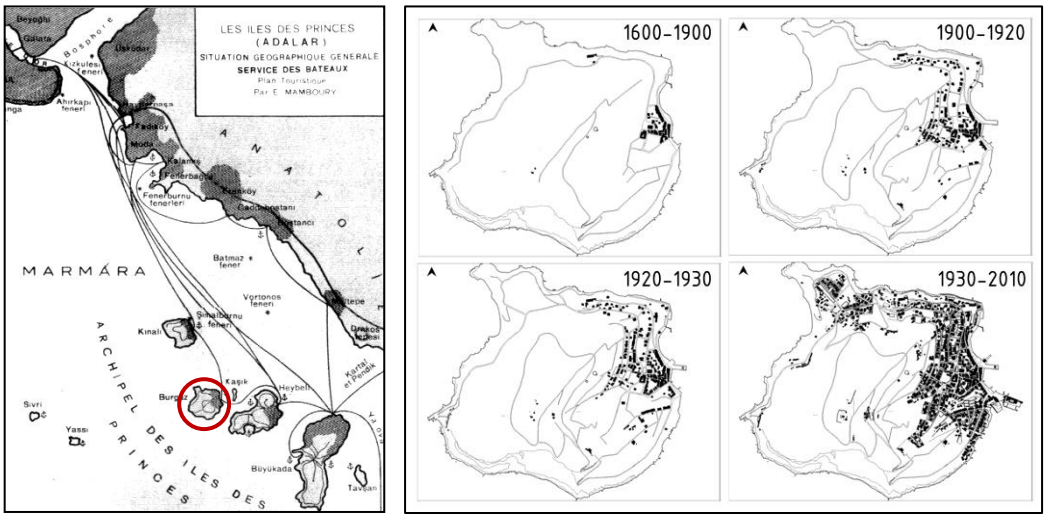

Figure 1: *Princes' Islands in 1951 (Burgazada is in the red circle) and the spatial development process of Burgazada (Source: Karsan, 2007)*

3. Research Methodology: The Placemaking Strategy

The placemaking strategy is a conceptual study of sustainable design and planning, which focuses on development of settlements at urban edges. The concept first offered by Deviren in 2006, applied and tested in Serenbe Community in Atlanta, Georgia. Afterwards, the strategy has been revised and used at two housing developments called Garden City Puchenau and Solar City, located at the urban edge of Linz, Austria.

The main aim of the strategy is to inform the design and planning process of making places while allowing for growth and preventing sprawl (Deviren, 2010). The strategy is also in connection with quality of life, sustainability of natural sources, conservation, human-nature interaction, community relations, ecology and etc.

The placemaking strategy aims to create an intersection between theory and practice. Hence, the results of the conceptual study associate with visions and design strategies which can be classified in 3 categories: *short, medium and long term goals*. To achieve the goals within the placemaking strategy, 12 concepts have been listed which act as informing guides and each concept leading to an operative phase of habitat creation at the urban-rural interface (Deviren, 2010). Within the sampling in this study, 13th concept has been added by Kürkcüoglu in 2011 due to the special characteristics of Burgazada after analysing the settlement in field studies. The concepts and their brief definitions are listed in Table 1 (original extended content can be found in Deviren, 2010):

Grounding	Determination of a particular center, which can reconnect daily routine of its inhabitans with basic sources of life.
Density & Sectional Hierarchy	The density of built forms within the dwelling context in vertical directions, which determines a new topographical condition on a particular piece of land.

Open Bounding	Creating containment in a community settlement where the character of its outline is not determined with physical barriers.
Diversity and Individuality	Personal freedom of choice and individuality by offering integration of critical non-residental land uses.
Passages and Thresholds	Open flow between inside and out with structural organization and orientation patterns (passages) and a tool for sustainable settlement development at the edge between urban and natural areas (thresholds).
Domain and Community Spatial Order	The system of spatial organization within qualitatively defined areas which are divided by paths.
Sustainable Technologies and Building Typologies, Energy and Settling Strategies	Tools for high level of energy efficiency, functional diversity, individual and public comforts; which also reflect the land and ecosystem they built in.
Landscape Design Strategies with In-Between Space Utilization and Microclimate Creation	In-between spaces can be used for creating microclimatic comfort spaces, recreation, community gardens, gathering places etc.
Authenticity, Materiality and Detailing	An honest planning and architectural language born from contemporary needs seeking real, practical, sustainable and liveable solutions.
Scaling & Critical Multiplication	Multiplying an optimal size, density, and set of internal land uses according to the laws of critical mass of a given population and allowable area of land; when the settlement has reached optimum size.
Continuity and Connectivity	The conception of how individual settlements interact with transportation webs both ecologically and systematically.
Constellating Eco Urbanity	Presents a healthy development strategy, also including social organization strategy. The constellation presents the opportunity for systematic coherence, identity and diversity in use.
Visual & Spatial Contact Between Typical Landmarks	Providing benefits for inhabitants in case of perception, sensation, adoption and orientation. Conception of how elements of identity influence the development of urban fabric and behavioral mechanism.

Table 1: *13 concepts of Placemaking Strategy (Source: Deviren, 2010)*

In the following sections, the concepts of proposed placemaking strategy will be tested in conjunction with the analyzes of the field study and visions / urban design strategies will be conceptually determined for short, medium and long terms.

4. Site Analysis and Observations on Burgazada Through 13 Concepts of Placemaking Strategy

In this chapter, thirteen concepts of “placemaking strategy” have been tested and supported with diagrams and photographs.

Grounding

Because of the morphological structure of the island, Burgazada’s form occured linear along the coastland and arc-shaped in total. Topographic thresholds have an important role in formation of the settlement. The historical and commercial center is in the middle of the settlement and directly connected to the surrounding urban fabric. The center is also connected with main transportation networks like sea transport and traditional phaetons (Figure 2). It contains places for shopping (daily needs), working (traditional occupations), tourism (restaurants along the coast) and gathering (public spaces). Street pattern is organic and contains vista points through the sea. Residental pattern is mostly self-contained with private gardens.

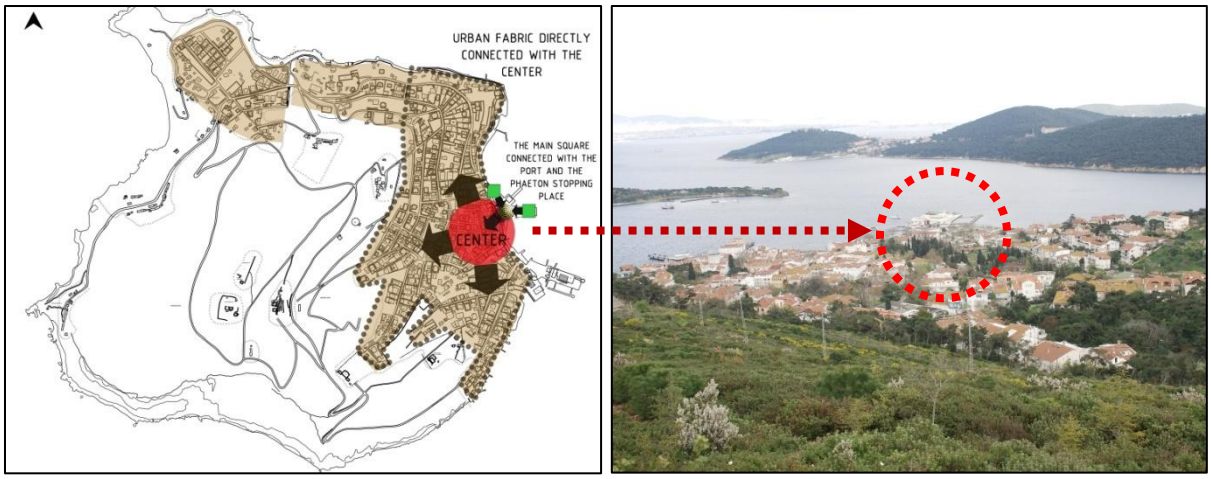

Figure 2: *"Grounding" on spatial layout and the traditional center within the urban fabric*

Density and Sectional Hierarchy

Medium-rise and medium-density levels dominates the island's housing pattern and the sectional hierarchy is homogeneous throughout the settlement. 3 and 4 storey buildings are mostly common, however, 5 and 6 storey buildings can be rarely seen both at the center and at the edge of the island. Most of the buildings oriented appropriately for sunlight and vista related with the topographical circumstances (Figure 3).

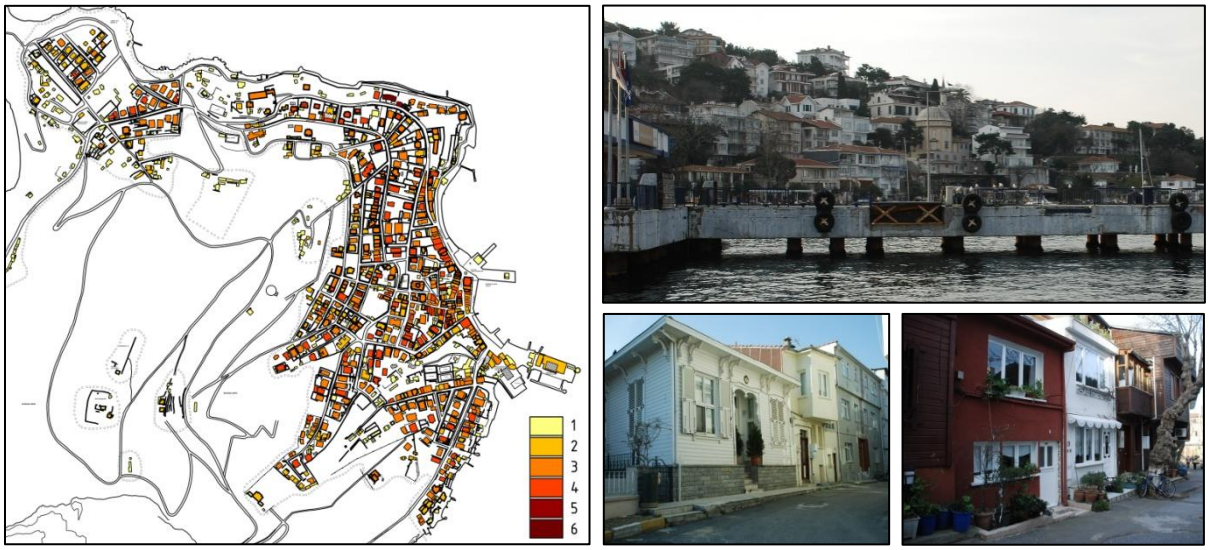

Figure 3: *Floor analysis and the diversity of the rise and density within the island*
Source of the analysis: Karsan, 2007

Open Bounding

The main coast road and the parallel secondary axes and are all intersect on the main square, which is also connected with the transportation nodes. There are also vertical axes connecting the parallel roads, sometimes seen as stairs. All roads are available for pedestrian walkability and some of them contains border elements to prevent the access of phaetons (Figure 4).

There are further secondary pedestrian paths exist between the buildings and towards the green lands. Some paths leading to private gardens are restricted with fences and gates. The natural border between the urban fabric and the surrounding green zone is mostly open, however there are fences in some places where ownership changes from public to private.

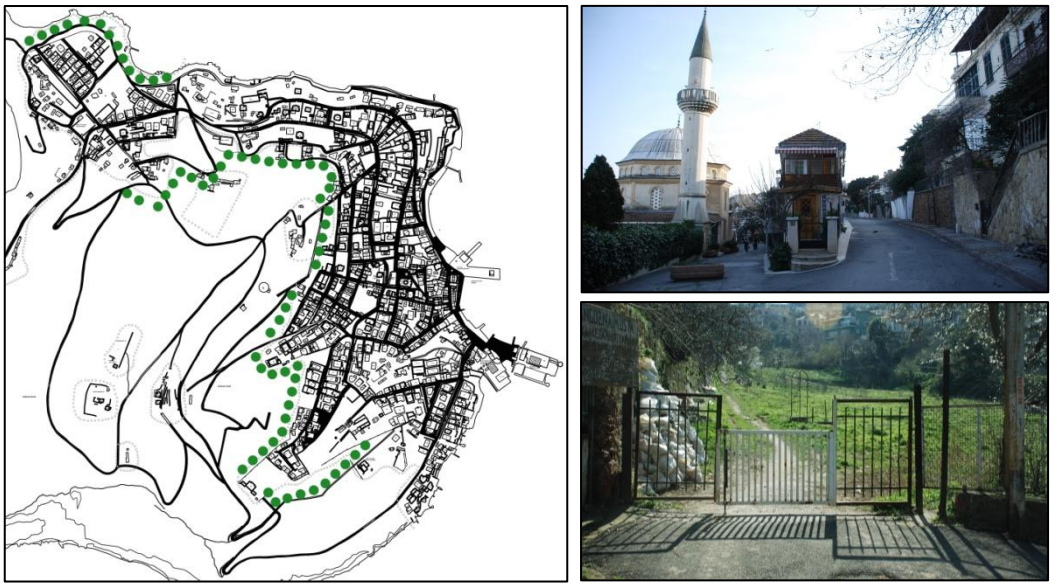

Figure 4: *"Open Bounding" layout; black lines are the street network and green dots are the invisible borders between the forest and settlement. Fences / border elements inhibit vehicles and pedestrians.*

Diversity and Individuality

In Burgazada, there are varying house typologies such as old mansions, single-family villas and multi-family housing units with or without private gardens and between 1 to 5 storeys. Diversity of ethnic origins influence housing typologies and functions of buildings (mosque, church, monastery, cem house, etc.). The gardens also contain various medium-quality places for different uses such as gathering and planting. Plot and garden sizes enlarge outer from the historical center. Also, planting activities are mostly seen on the edge of the settlement (Figure 5).

Figure 5: *Diversity in housing typologies (old mansions) and garden uses (planting)*

Passages and Thresholds

Within the whole residental area; there is no vehicular traffic except emergency vehicles like ambulance, police cars and garbage trucks. However, use of phaeton and bicycle is widespread. The phaeton has its own destination and some of the roads are forbidden for its access, blocked with natural/artificial barriers.

There is a conservation area of natural vegetation which generates an invisible threshold for the built environment. Fences and barriers inhibit crossings to some parts of the protected land, at the same time there are too many paths to the forest from the residental area. These paths are softly covered (with natural stones) or not covered (Figure 6).

Figure 6: *Passages (green arrows) and thresholds (orange dots), the cover of the paths differs depending on location*

Domain And Community Spatial Order

Spatial order of the settlement is like a belt surrounding the coast and sprawls to the hill both on the northern and eastern sides of the island. The historical center is a qualitatively defined area divided by paths and segregated from the housing units with different building typologies. The spatial layout of building heights is homogeneous and only the edge of the settlement dissociates from the nucleus with density of the residental areas; which is low-density at the edge, high-density in the nucleus.

Sustainable Technologies and Building Typologies, Energy And Settling Strategies

The building typologies can be grouped in two categories: old-style buildings (mansions) and new-style buildings (single or multi-family housing units). All buildings made with reference to the traditional building systems. So, there is no specific example built with sustainable energy technologies, only some buildings constructed / reconstructed with modern technological systems or contemporary materials.

Landscape Design Strategies with In-Between Space Utilization and Microclimate Creation

The coastal area is the main recreational and public zone of the whole island. It contains many functions like gathering, eating and drinking places, play areas for children and it has its own microclimate due to the sea. Apart from the recreational area in the coastline, there are few public spaces in between the residental areas; which are small, seperated and introverted. Also, there are small places for many activities created by the habitants between narrow streets or in the gardens with natural or artificial materials. These places are controlled in terms of rain, wind and sunlight.

The courtyards of the blocks have different functions depending on the use of the surrounding buildings. They have their own microclimate due to the features used in the spatial organization (like water elements and tents). Inclined streets (which directly link to the coast) are also like natural ventilation corridors and they convey wind to the hills from the sea (Figure 7).

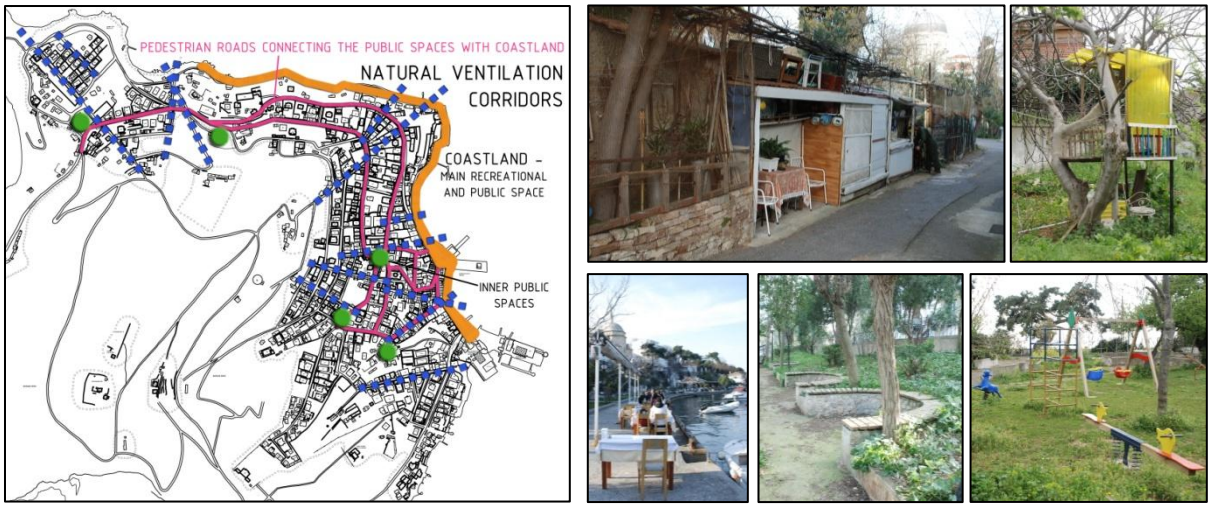

Figure 7: *Public places and in-between spaces with their microclimate*

Authenticity, Materiality and Detailing

Materials of the buildings are from both traditional (wooden materials, stone work, etc.) and contemporary (glass, etc.) styles. Traditional buildings have their own originality in colour, ornaments and in some building parts especially seen on oriels and roofs. The whole urban fabric is still in harmony although the urban renewal process up today. Although this process, there's no specific example of high-technology or sustainable building system.

Scaling and Critical Multiplication

The boundary of the settlement is defined all by natural features, the outer boundary is the coastland which enclose the settlement like a capsule, and the inner boundary is the forest area which controls the urban sprawl.

Within the settlement, the multiplication of the housing units can only be seen at the northern edge of the island. The new urban fabric of the settlement is like small-scaled, divided cell from the old settlement. It has its own nucleus defined with open spaces, but it's still linked to the center because of commercial, educational and occupational needs (Figure 8).

Continuity and Connectivity

The island is a component of a larger group of settlement (Princes Islands) and connected with only sea transportation. The sea transportation is available from the two sides of Istanbul and the route includes to visit all the islands in order depending on the distance. At the same time, transportation from one island to another is also handled with smaller motorboats. Within the island, the main transportation network is pedestrian oriented, which also includes bicycles and phaetons. The pedestrian access is available to each region, except some areas belong to private domain.

Constellating Eco Urbanity

The urban fabric of Burgazada is a result of an organic development process through the history. The development process clearly represents that spatial organization occured spontaneously by inhabitants. The future development of the island would be the same, because the physical boundaries are constant and the general characteristic of the housing layout is defined.

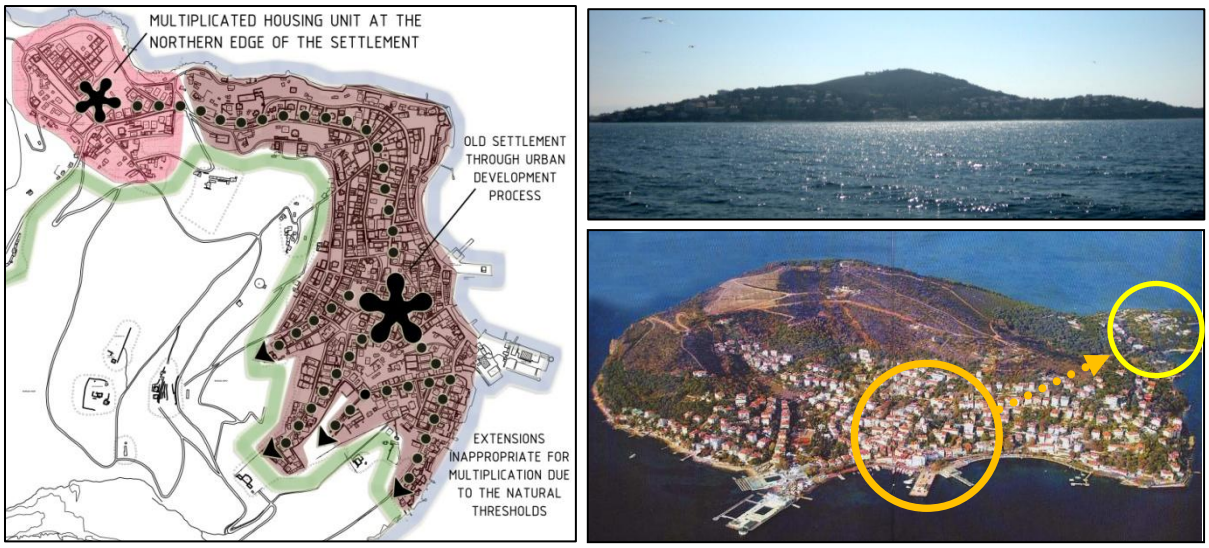

Figure 8: *The edge of the settlement as a small-scaled multiplication of the historic center*

Visual and Spatial Contact Between Typical Landmarks

The settlement has its own landmarks which connected each other within both visual and spatial context. Landmarks can be classified in 7 categories: (I) Religious buildings, (II) Monumental trees, (III) Open spaces as focal points, (IV) Transportation nodes, (V) Uses of coastal areas, (VI) Educational units, (VII) Graveyards. Each landmark has a link with another in spatial organization. In this way, wayfinding and orientation become easier especially for pedestrians. Also the linkage map shows the unique character of the settlement (Figure 9).

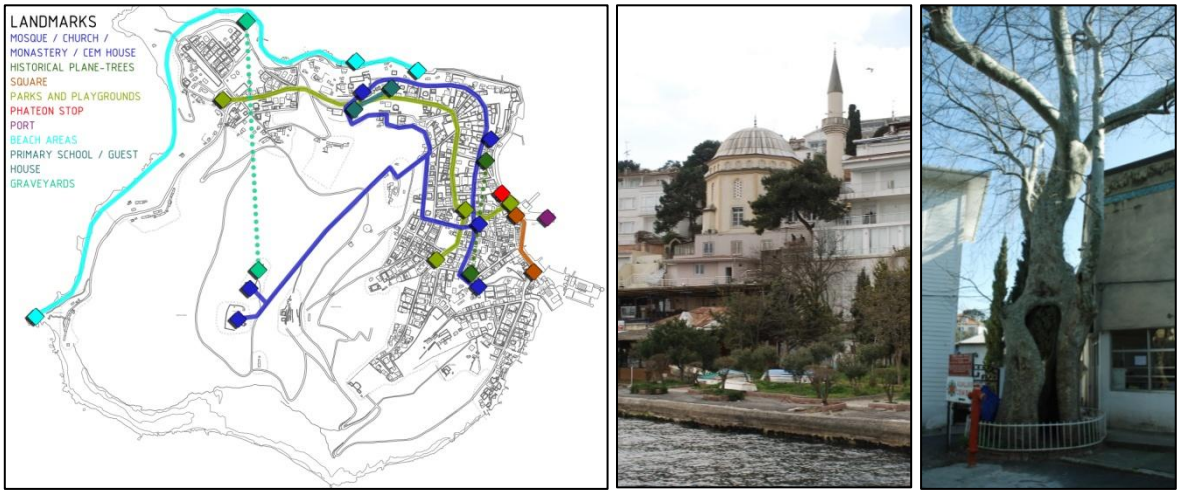

Figure 9: *The linkage map of the landmarks of Burgazada, mosques and monumental trees*

5. Visions and Urban Design Strategies for Future Development of Burgazada

Associated with the site analysis through the concepts of placemaking strategy; visions and urban design strategies for the future development of the island classified in three categories: short, medium and long term goals. All of the strategies determined under these categories are consecutive and interrelated. Therewithal, the strategies are all conceptual and general; in other words, as a guide for future urban design studies.

Short-Term Goals (Figure 10)

- ✓ **A Defined Main Pedestrian Artery,** which is connected with historical buildings, coastland and landmarks with a special / different floor cover and street furnitures. The artery should also be integrated with landscape, public spaces and transportation nodes.

- ✓ **Path for Bicycle Tours** to integrate the urban fabric with the forest. The path should include parking, stopping and resting places; which are associated with passages and viewpoints to allow users to explore the landscape.
- ✓ **Periodic Public Transport with Non-Motorized Vehicles –** The phaeton is a exclusive and unique vehicle for the island, and it's especially for tourist activities. The individuals of the island mostly behave as a pedestrian. There is need for a route of public transportation especially for elder people. The routes should be between the central and the peripheral zones per hours, with a local vehicle working with horsepower like phaetons.
- ✓ **Integration of the Monastery & the Church on the Hilltop with Main Pedestrian Artery** to maximize accessibility to the church and the monastery with enhancing links within the main pedestrian artery. The topographical conditions restrict accessibility to the church, monastery and other places on the hilltop. The path should be connected to the most prominent points of the main pedestrian artery, with stairways in some places.

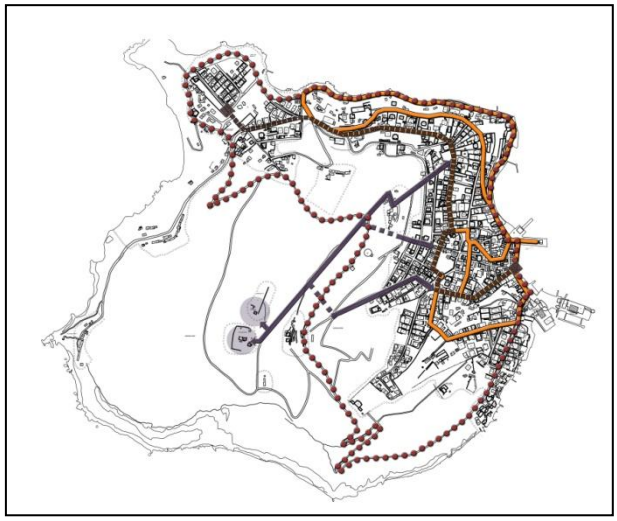

Figure 10: *Short-term goals; orange line represents the main pedestrian artery, red dotted line represents the path for bicycles, brown dashed line represents the public transportation route, purple line represents the integration of the hilltop with the main pedestrian artery*

Medium-Term Goals (Figure 11)

- ✓ **A New Identity for the Coastline** to integrate the separated shores and to gain maximum interaction with the sea. With reorganization of the coastline, utilizations can be increased especially for tourism activities. In addition, boat trips can be made between the old pier and Kalpazankaya, the most important focus point of coastal tourism in Burgazada.
- ✓ **Improving and Reproducing Public Green Spaces** with recycling lost spaces between the plots and healing the existing green areas. New functions should be organized like community gardens (gathering, planting, etc.)
- ✓ **Reinforcement of Sea Transportation** with augmenting the trips from Istanbul & other islands using motor boats with less passenger capacity)
- ✓ **Development of the Urban Edge** with implementation of missing functions like infrastructure, commercial and health facilities. The relationship between the residential area on the edge and the center should be the maximum level.
- ✓ **Passages Between the Forest and Settlement for Recreational Uses** in order to strengthen the transition between the forest and the urban fabric. Related with the small public green spaces in the settlement; sports, and recreational facilities can be applied. These applications can also emphasize the border of the built environment.

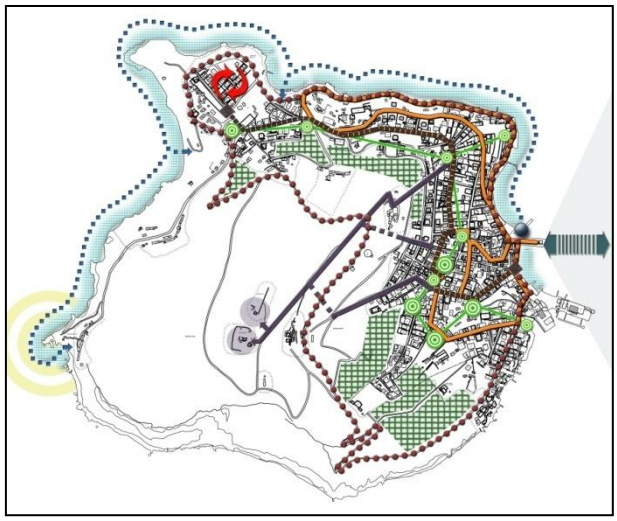

Figure 11: *Medium-term goals; blue line along the coast represents the integration of the shoreline and the boat trips, green lines and concentric circles represent the integration of green spaces, gray arrow symbolizes the reinforcement of sea transportation, red arrows symbolizes the development of the urban edge, green patchwork represents the green spaces between the forest and the settlement*

Long-Term Goals (Figure 12)

- ✓ **Restriction for New Development Areas** to prevent urban sprawl moving toward the forest areas. The boundary between the forest and the settlement should be reorganized. It should soften with recreational facilities and uses, and squatters should be removed. The coastal area, which is using for mining currently, can be transformed into an extension of the coastline with new identity in the future.
- ✓ **Renewable Energy Policy for New Buildings** for new structures or reconstructed old buildings, they should be supervised by renewable energy policies. Architectural design of these buildings should be based on producing renewable energy.
- ✓ **Energy-Producing Units on the Slopes** in order to contribute the settlement in terms of energy production, units like solar collectors, wind turbines, small water treatment units, recycling containers for organic waste, etc. can be constructed on the slopes of the hill which are separated from the residential area with green public spaces. All of these units should be covered with natural elements in order to keep the original silhouette effect.

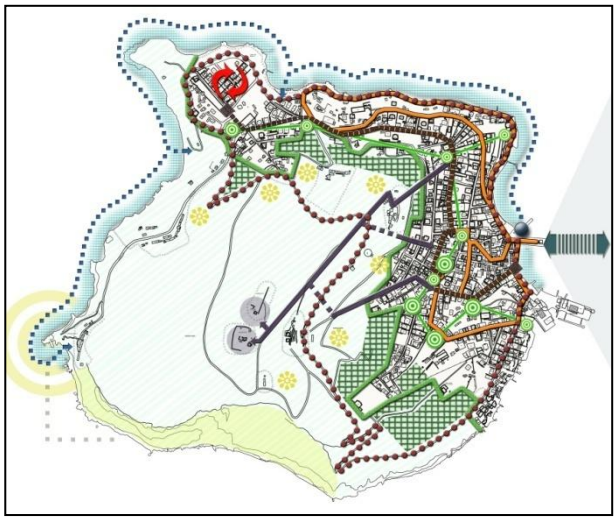

Figure 12: *Long-term goals; curved green line and green diagonals represent the boundary between the forest & settlement and yellow symbols represents the energy-producing units*

6. Conclusion

As a result of the research and conceptual framework, the characteristics of Burgazada settlement were identified and evaluated. Associated with the conceptual "placemaking strategy" study; most important findings can briefly listed as dependency to the natural thresholds, center-oriented development, prominence of the coastal areas, dissociation of the urban edge, disintegration of public spaces, disconnection of the forest and urban fabric, the threat on traditional architectural style, diversity of public uses and pedestrian-oriented accessibility. Possible scenarios for future development should be taken into consideration of sustainability context; therefore, micro implementations which preserve the historic identity and provide healty living conditions are offered through separated processes. Short-term strategies mostly concentrated on the movement and orientation of inhabitants, medium-term strategies focused on entegration of urban spaces and long-term strategies emphasized on sustainable energy policies and prevention of urban sprawl.

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