

A Proposal for an Ecological Park towards a Sustainable Humane Habitat in Abu Qir, Alexandria, Egypt

Amira ELNOKALY¹, Ahmed ELSERAGY², May GAMAL³

^{1,2} Assistant Professor, Architectural Engineering and Environmental Design Department,

³ Postgraduate Candidate in Environmental Design Master Course, Arab Academy for Science and Technology, Alexandria, Egypt,
amira.elnokaly@aast.edu; ahmed.elseragy@aast.edu; may_gamal_1@hotmail.com

ABSTRACT

This paper represents a preliminary stage of a multiphase research-project, carried out at the Arab Academy for Science and Technology (AASST) by the Environmental Design Research Group (EDRG) looking at alternative proposals for urban development strategies at Abu Qir Area in Alexandria, Egypt. Abu Qir is located east of Alexandria has a very important productive bay on the Mediterranean Sea and its eastern and south east coast is the only mirror of Egypt on the Dead Sea. Besides being one of the most important spots on Alexandria bay, Abu Qir is considered one of the highest polluted areas in Alexandria, although the area itself has a very high potential on the Mediterranean and the Dead Sea. This paper explores the design and development of an ecological park as a part of the urban development at Abu Qir bay. The paper investigates the proposals of conceptual design strategies for an Ecological Park at Abu-Qir. Lessons learnt from examples that have successfully introduced and developed the ideas of Ecological parks in the international built environment are reviewed.

Parks are key elements in **the urban ecosystem**, serving dual roles as core zones of urban nature and as multi-use recreational open space. Moreover, as part of an open space system, they play important functional roles as part of landscape-scale habitat and hydrological networks.

Today, there is an urging need for the development of urban parks. As urban populations have rapidly increased through civilization and industrialization, cities have been enlarged, nature has been impaired, and human relations have been damaged. For these reasons, people have lost the opportunity to come into contact with nature. Environmental problems such as air and water pollution have resulted, in conjunction with a gradual decrease in natural surroundings. Ecological destruction has caused the landscape to be devastated. For this reason, ecological parks, places serving to reintroduce beautiful birds and insects into the devastated landscape, are needed. There is a need for ecological parks as places where sound ecological values can be instilled and established through the observation and study of nature. Higher priority is given to the ecological environment than in other parks.

The design proposal of the ecological park is a place that is ecologically restored and preserved for the purposes of scientific observation and study, and also to provide an easily accessible place for visitors to observe plants, animals and insects living in their natural environment. The proposed park also plays an important role as an educational open classroom for the community and aims at raising global awareness issues in Abu-Qir, thus ensuring that children grow up with an awareness of the global problems facing the world today, and how they can contribute, as active members of the society, in reducing the consequences of pollution and global warming we have created with our own hands. The paper analyses the Abu Qir village potentials and constraints and put forward an urban development strategy based on this analysis. The paper then presents the strategy that has been established to thoroughly preserve, protect and maintain areas of rich natural resources at Abu Qir, and method have been developed to allow enjoyment of them with minimum artificial influence. Eco-tours have been developed for observation of ecosystems. A variety of opportunities to experience nature has been made available by minimization of human interference and by the introduction of an "Environment Commentator" as will be discussed in this paper.

Keywords: Ecological Park; environmental awareness; global warming; Abu Qir; Urban Ecosystem

Introduction

Recent years have seen a growing awareness all over the world over the need to find more sustainable solutions for industrial and household waste. An Eco-Park in Abu-Qir region should be a sustainable showcase site.

Abu-Qir village is a region with lots of potential and it now represents the old city of “Canope” lying east of Alexandria returning to Greek era (300 B.C) [1,2], it includes two suburbs Herlion and Menthiou [3,4], they’re assumed to be obscured under sand. Abu Kir is located in a highly promising site overlooking the western side of historic Abu-Qir Bay. It is also close to Lake Idku and historic sites of Rosetta city and Rosetta region, which includes Lake Idku and associated wetland [1]. The vicinity to too many historic and tourist sites makes it appealing for various types of tourism including eco-tourism, historic and religious tourism as well as commercial activities. The city suffers from many environmental problems including shortage of services and infrastructure. Some of the existing environmental problems include loss of marine biodiversity due to increased load of dumped waste in the bay and loss of agricultural and bird biodiversity due to deterioration of soil conditions and water quality in the region. The impact of climate change and global warming is another threat to the region [5]. The regional attraction potential is expected to increase after the construction of an international coastal highway connecting Matruh and Alexandria cities (at the northwest of Egyptian Mediterranean coasts) to Sinai and Arish City to the east.



Figure 1 Map Depicts Abu-Qir Port and its Relation to Other Euro-Mediterranean Cities

1. Greener Abu-Qir City

A green city will produce thousands of living wage jobs, lower our reliance on expensive and polluting fossil fuels, create recycling and reuse programs, housing rehabilitation, environmental remediation, energy reduction and overall, generate a planet-friendly way of life [6]. Green is the color of a sustainable future for our children. A little bit of greenery in urban areas can cool off the hotter and stickier summers that city resident's face as a result of global warming. Planting more grass and trees could keep people more comfortable and reduce air conditioning costs and energy.

The ecological and sociological "footprint" of cities has spread over ever-wider areas, creating an urban-rural continuum of communities that share some aspects of each lifestyle. Fewer and fewer places on the planet are unaffected by the dynamics of cities. Rapid urban growth and suburban sprawl have heightened concern in many quarters about sustainable development. Are economic growth and environmental health always mutually exclusive goals?

What exactly is a green city? A greener city is a stronger city, one better able to attract and retain jobs and people. Urban green spaces offer important aesthetic, economic, environmental and social benefits, thus it is our job as architects, planners to secure a greener future to our cities.

2. Improvements for Public

Convinced that the general objective of turning Abu-Qir Bay into an area of dialogue, sustainability, stability and prosperity requires a strengthening of democracy and respect for human rights, and social development, measures to combat poverty and promotion of greater understanding between cultures. Park and public spaces improvements focus on direct benefits to the users and future sustainability.

These improvements include replacement of hazardous play equipment; parks furniture improvement; improvements to existing playing fields for increased youth sports opportunities; basic infrastructure improvements, including rehabilitation of sports courts, lighting, eroded walkways and renovations to irrigation systems [7]. Planting different types of trees forming comfort for the public, such as shade trees, aesthetically, avoid unwanted winds and noise caused from streets. As well as cleaning vacant areas and switching it to a green area, could be functioned or just as beautification element.

3. Implement Green Plan, a comprehensive open space plan for the city.

Alexandria is one of the major cities on the Mediterranean currently without a comprehensive plan for managing and supporting open spaces. Putting in consideration that cities across the Mediterranean are providing energy-efficient, least polluting and healthy living spaces. The following should be considered:

Manage vacant land as a significantly valuable asset; Simple immediate steps such as removing debris and planting grass and trees shall improve property values and stop population loss and reduce crime while attracting new businesses, private investments, and residents.

Support development and preservation of community-managed green spaces; Community gardens, mini parks and the smaller open spaces that are used and maintained by neighborhood volunteers are a significant benefit to the city's landscape.

Promote and invest in a localized approach to storm water management; Test sites proving that open spaces such as parks, streetscapes and clean and green lots can in some cases be retrofitted to receive storm water and help relieve localized flooding problems.

Develop the city park system through leadership, partnership and resources; Research consistently shows that investment in parks promotes economic revitalization, attracts new residents and makes cities more livable. Parks need vision, leadership, planning, resources, maintenance, and stewardship.

Plant trees in the city's neighborhoods; Trees in urban neighborhoods increase heat and pollution in the city. The current tree planting and management system is under funded, inadequate, and falls short of protecting and improving the city's "urban greenery."

Promote public and private investment in "civic" landscapes; Investment in Center City's most treasured open spaces, gateways and vital streetscapes.

4. What is an Eco-Park

An ecological park is a place where wildlife habitat is introduced into a city so that it is able to be self-maintaining according to ecological principles (e.g. diversity of species, ecological soundness, sustainability, etc.), and into which appropriate wildlife is introduced that is able to be maintained with minimal energy supply. Higher priority is given to the ecological environment than in other parks.

The idea of Eco-Park or eco-industrial parks roots back to the notion of eco-industrial development. Lowe and Warren [8] defined the idea, describing it as:

'A community of manufacturing and service businesses seeking enhanced environmental and economic performance through collaboration in managing environmental and resource issues including energy, water, and materials . . . the community of businesses seeks a collective benefit that is greater than the sum of the individual benefits each company would realize if it optimized its individual performance.'

The US President's Council on Sustainable Development produced another precisely used definition, similar to the above, but also indicating the local community to be central in both collaborating and benefiting from an eco-park [9].

With the rise of environmental issues due to the expansion and development of cities, and the consequent change in value systems regarding man-made environments, recognition of the importance of ecology has increased, along with the need to reduce the maintenance expenses of conventional parks. The eco-park is envisioned to include a range of sustainable and restorative uses related to organic agriculture, biotechnology, and aquaculture. For these reasons, the ecological park has emerged as a new type of a park.

4.1 Local Ecological Parks: Utilization and Management of Rich Ecosystems; A system has to be established to thoroughly preserve, protect and maintain areas of rich natural resources, and methods to be developed to allow enjoyment of them with minimum artificial influence. Eco-tours are developed for observation of ecosystems. A variety of opportunities to experience nature is to be made available by minimization of human interference and by the introduction of an "Environment Commentator".

4.2 Urban Ecological Park: Creation of Biotopes Based on Scientific Data; The quality of the urban environment has to be improved by means of restoration and improvement of lost or weakened ecology foundations within urban areas, enabling wildlife to live in these areas. Habitats needs to be created based on scientific data on the formation of natural ecosystems, for the purposes of recreational experience of nature.

4.3 Creation Theory of Ecological Parks

- **Biological Diversity** This refers to the diversity of genetic factors, species, biotopes and so on. Biological diversity varies proportionally with ecological stability
- **Ecological Soundness** This can be secured by means of maintenance of independent procreativity within an ecosystem and allows viable ongoing exploitation of biological resources.
- **Sustainability** Ecological perpetuity can be maintained by means of continuous preservation and reproduction of biological resources.
- **Minimal Energy Supply** Artificial energy supply can be minimized as a result of a circulatory system of nature forming.

4.4 Public Awareness

Eco- Tour an educational tour in which an appointed number of tourists can appreciate the importance of ecology through an appointed program conducted by a professional docent in an ecological site having high ecological value.

Nature Facility Study This is a facility created so that students can have the opportunity, not usually available at home or school, to come into direct contact with and understand ecology (or, artificially created ecology), to learn the virtues of order, cooperation and sacrifice, and to exercise their minds and bodies through living and training in a group.

Nature Observation Facility This is a facility created so that citizens can have easy access to and observe nature.

Theme Gardens These are theme parks created so that visitors can view specific species of wildlife, and are intended to maximize display effectiveness by means of reproduction of those species.

4.5 Utilization of Ecological potential

Living environments are created through the use of ecological principles, such as minimization of energy supply and wastes, and the utilization of biological diversity, sustainability and self-circulating potential of natural ecosystems in residential areas, external space and eco-cities. Biological diversity is enhanced and natural ecosystems is restored through the introduction of nature-friendly environments into existing impaired ecosystems, for example, introduction of waterways, replacement of species of trees with artificial forests, improvement of simplified park forestation, etc.

4.6 Significance of Ecological Parks Creation

Minimal Energy Supply; Park and landscape maintenance costs should be able to be kept to a minimum, as energy expenses should be significantly lower than those for existing artificially created parks.

Educational Significance; Parks should be created without disturbing natural environments so that they may serve as effective and ongoing tools for environmental study and education.

Preservation of Nature; Destruction of nature and environmental pollution can be decreased, and the beauty and value of land can be improved by restoring impaired areas at minimal cost.

Restoration of Nature; Natural elements are introduced into cities which have become estranged from nature, and opportunities for citizens to come into direct contact with nature are increased. By means of introducing natural habitats into malformed urban ecosystems, the soundness of urban ecosystems is pursued and ecological productivity required for the area is improved.

5. Successful Example of the Built Environment

5.1 Mediterranean Strategy for Sustainable development

This strategy [10] provides a policy framework to deliver sustainable development [11], i.e. to meet the needs of the present without compromising the ability of future generations to meet their own needs. It rests on three separate pillars - economic, social and environmental [12]- which need to reinforce one another to ensure sustainable development. The economic, social and environmental consequences of all policies thus need to be examined in a coordinated manner and taken into account when those policies are being drawn up and adopted.

5.2 Examples of Eco-Parks

5.2.1 SANILLÉS; Thermal Spa and Eco Park: "Sanillés [13] is an Eco-Living project in an ideal setting in the Spanish Pyrenees". Its mission statement - "Health is a Function of Participation"

The Campus foster learning and re-education through enquiry, exchange, research and experimentation, focusing on integrated health-care, bio-intensive food production, and sustainable living. There is a number of different renewable energy sources applied within the park such as;

Thermal Springs: There are 4 thermal springs emerging at 29 °C. In 2000 they drilled a new bore near the existing springs and found a large source of thermal water at 34.5°C [13]. It was planned to use this important source of heat for a therapeutic thermal centre, under floor heating all using a heat pump in the boiler room.

Practical and Economically viable solar installation; An installation of 66 solar installations, 2.2 square meter hot water solar panels was completed in 1997 and has been in continuous use since. The 12,000 litre accumulation tanks are glass-lined, for maximum corrosion resistance and the installation is designed for an economic life of 25 years. It provides between 25% and 40% of the heat requirement of the whole building complex [13].



Figure 2 Thermal Springs and Solar Panels Installed in the Sanilles Park [13]

Solar central heating; Hot water from separate accumulation tanks provides water at 40 °C for under-floor heating. Long wave-length radiation from the ceramic floor tiles is particularly effective in warming the body. The low temperature required and the heat storage effect of the floors makes the system ideal for solar central heating, which is used throughout the ground floor of the main building. Heating is needed for eight months of the year.

Swimming pool heating; The excess heat from the solar panels goes to the outdoor swimming pool which keeps it at 23 °C. Thermal water at 34°C from the borehole present is pumped to the pool at the rate of 7500 litres per hour which raises the water temperature to 30 °C.

Solar Heat use in the bio-vegetable garden; there is a short growing season with fiercely contrasting day and night temperatures. There is a greenhouse on the earthed flat roof of the room housing the accumulation tanks and boiler. Warm air rises to it and the boiler flue gases supply carbon dioxide, moisture and warmth to accelerate planted growth and provide protection from frosts.



Figure 3 The Solar Heated Swimming Pool and the Bio-Vegetable Garden [13]

5.2.2 Birmingham Eco-Park

The Park is designed to provide a stimulating and educational environment [14]. There is a path to take the visitor beside ponds, through woodland, flowering meadow and heathland, with places for rest and reflection. The park is also designed to be a safe and enjoyable place to work and spend time. The demonstration Wildlife & Perma-culture Gardens show how people can help their own garden. The wind & solar power and water recycling systems installed in the park are suitable for larger gardens. These installed renewable systems works as a showcase. The demonstration woodland and ponds have a profusion of wildflowers. Frogs, herons, dragonflies, butterflies sparrow hawks and foxes are among the wildlife regularly seen.



Figure 4 The Green Houses Assembled at the Birmingham Park [14]

EcoPark's Wind & Solar Production [14]; Wind and Solar energy is the future. There are a number of different wind turbines installed in the park shown in Figure 5. The wind seems to be blowing all the time, just waiting to be turned in electricity to power anything for free, with no pollution, and forever!



Figure 5 Water Recycling System and Wind Turbine at the Birmingham Park [14]

In the park there is a whole host of plants and wildflowers for sale which have been grown in the available poly-tunnels. Wildflowers can help attract wildlife such as butterflies and bees into gardens and parks, helping to redress the damage caused by modern intensive farming practices.

6. Case Study: Abu Qir Village and Land Use Plan

Alexandria Tourist Route

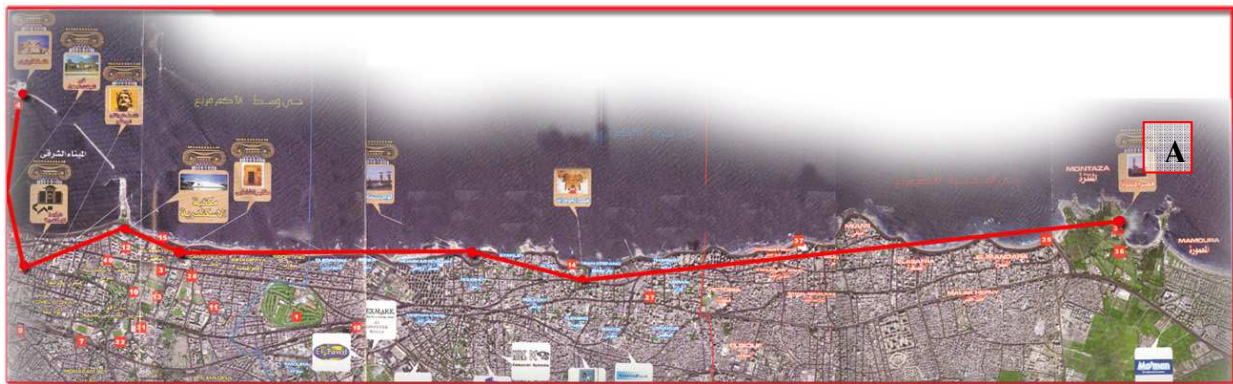


Figure 6 This is the Existing Alexandria Tourist Route which Ends at El-Montazah Palace Point A.



Figure 7 Continuing this Route Along the End of Alexandria Shoreline up to Abu-Qir Points A, B, C.

Abu-Qir is a suburb from Alexandria. Mainly it is composed of residential buildings with some commercial and industrial buildings. Total Area 60 km² divided into;

1. Built-up area 11.08 km²
2. Agricultural land 49.3 km²

Abu-Qir suburb has lots of potentials which distinguish its position:

▪ Natural resources as:

a. Geographical position: Triangular shaped peninsula extends into the Mediterranean Sea, surrounded by sea water from all sides which gives wide visual angle to the sea and makes it exposed to the world as shown in Figure 8. It's connected locally through two main lines and the third is internationally as shown in Figure 8:

1. Alexandria railway line;
2. Alexandria-Rosetta road;
3. International Coastal road which links all northern Mediterranean cities;

b. Geological position: mainly the lands' nature in Abu-Qir is sand through the coast and clay at the south. Also contains sand dunes composed of fine and medium sand but it suffers from horizontal penetration of sea water due to flood and ebb tides. Through studying the topography of Abu-Qir it appeared to be sloped towards north and North West ending up with zero level at the shoreline. Thus it can be a very important attraction point due to its location nationally and internationally.

C. Climate: Abu-Qir has a moderate fine climate most of the year.

1. DEFINING THE SITE

- WATERFRONTS SURROUNDINGS



2. ACCESSIBILITY



Figure 8 Abu-Qir Surroundings and Accessibility Routes

6.1 Site Selection and Design Approach

Environment aspects physical

The main physical environment element as the weather quality topography, soil and hydrology and the surface water all these factors affect in choosing the suitable site to reach the optimum ecological park

The design approach

The implementation of the user's requirements and the effect of the physical studies and the site analysis. The conclusion of the site visits, design criteria and the international codes, standards and landscaping requirements all affect the design approach.

Objectives of Consideration

To solve a healthy environment for the ecological park and to aware people of the importance on how to save energy to avoid serious problems caused by global warming.

Horticultural

Recommended list of plant and the specific criteria, specific environment and the selection of plan carefully implemented on the site.

Irrigation

It is the water management technology and effective maintenance to achieve the target to carefully operate and monitor the irrigation system.

Management

The implementation management and maintenance of designated garden and recreational space.

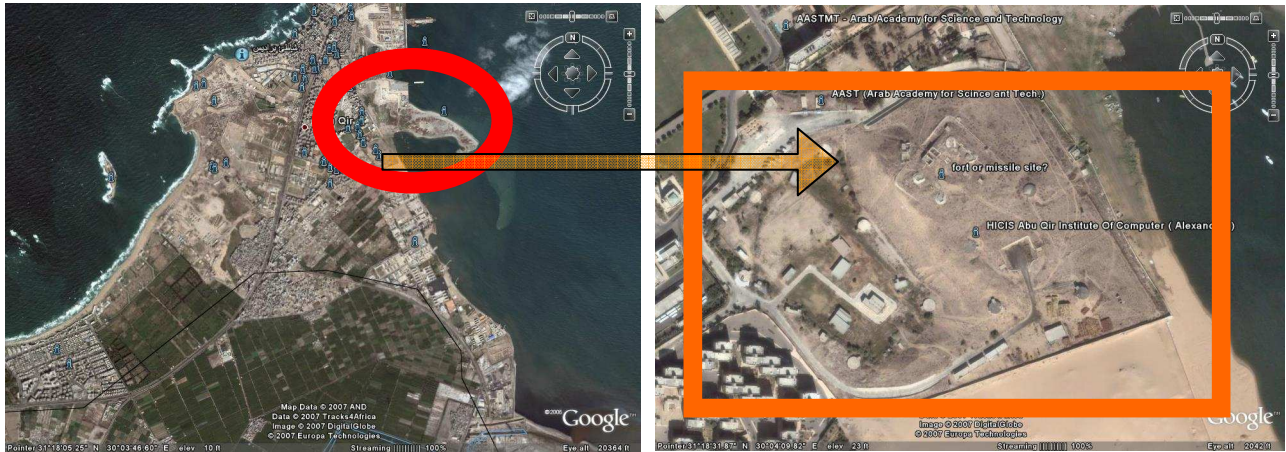


Figure 9 Site Selected in Abu-Qir Village Overlooking the Dead Sea

PLANNING PRINCIPLES

Remarkable and memorable shoreline experience; Spectrum of activities; Complementary land uses; Increased physical and visual access; Pedestrian priority; Economic vitality; Superior design; Environmental stewardship; Historical background; Neighborhood enhancement and protection; Coordinated planning process; Commitment to implement.

6.2 Studies for the proposed site: Site Analysis and Eco-Park Approach

Urban Aspects

Having medium and low density house development with low to middle income residents. The total neighborhood population is usually increasing.

The location of proposed site for the Eco-Park is located at the far end of Alexandria in between the Mediterranean Sea and the Dead Sea. Ideal area to be allocated as a park for the surrounding neighborhood to purify the environmental conditions.

Physical Aspects

Vehicular Access; Proposed site is accessible from several entrances. But to form an environmental friendly surrounding to be a car free zone, minimizing the amount of exhaustions caused from cars. Instead a cycling lane is to be introduced.

Pedestrian Access; This site is convenient to pedestrian movement to link all residential blocks. Pedestrian routes currently exist around the site with pedestrian short cut routes across the site and between the residential blocks. Specific trees and shading system should be initiated to create a safe, livable walk-able community for the residents,

6.3 Eco-Park Visual Analysis

Containment: The site is visually contained on all sides with wide openings at the north east and south west corners. To be oriented in specific conditions to reach maximum sun allowance to conserve for energy.

Views: Long distance views into the site are restricted and similarly distant views from the site are limited with the exception of a view to the Dead Sea. Short distance views from the site are varied according to different kinds of enclosure.

Features: Important buildings and Dead Sea, (Fish market being main feature) indicating that the area is a positive site to create an eco-park for the surrounding as it can act as an attraction focal point and a landmark to the site.

Figure 10 shows the maps for some of the important analysis carried out in Abu-Qir Region such as: Important buildings, Solid and Void relationship, Area Road Network and Land Use map.

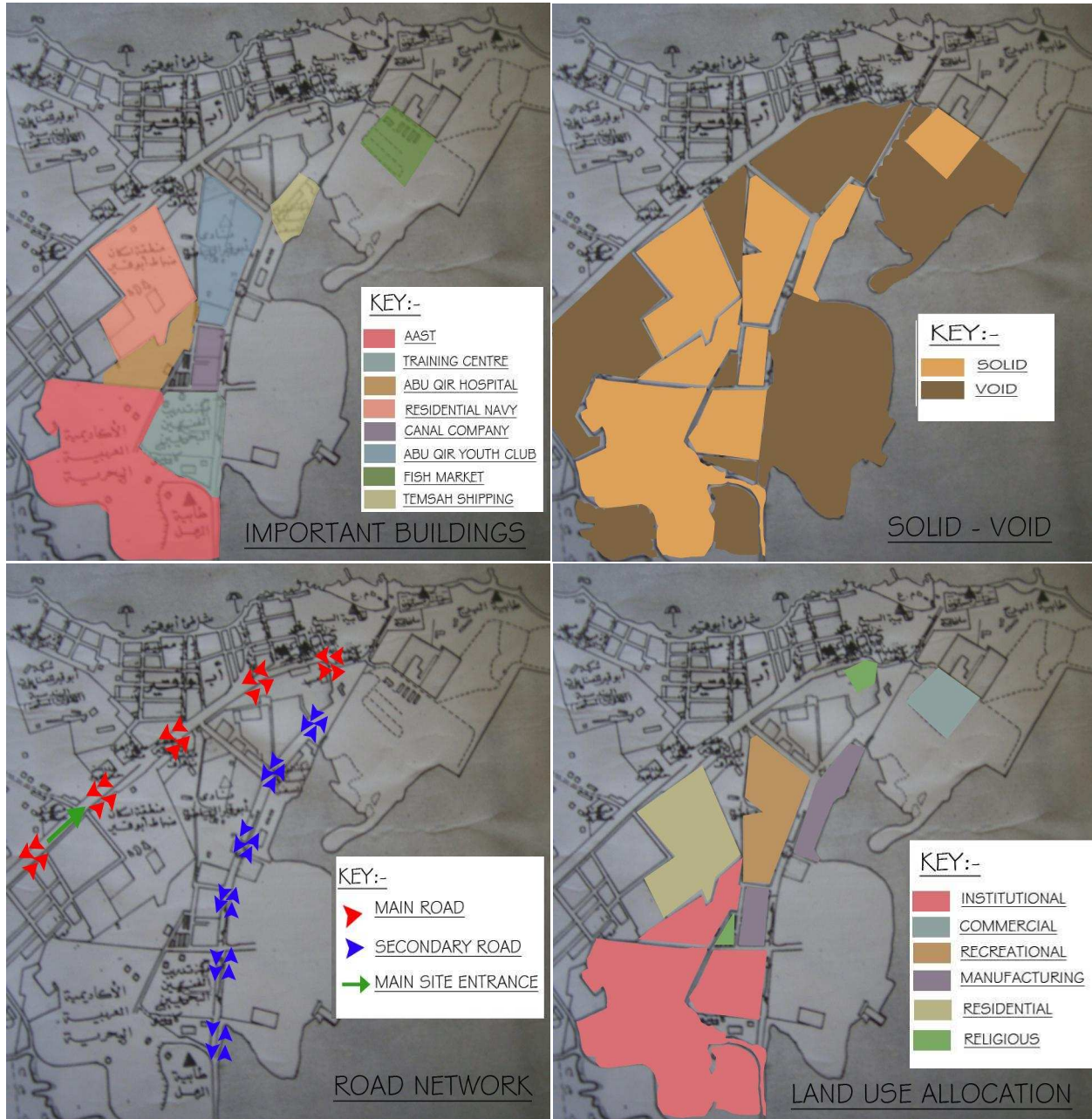


Figure 10 Maps shows Abu-Qir Important Buildings, Solid and Void Relationships, Road Network and Land Use Allocation

7. Design approaches & Implementation; Proposal of Eco-Park in Abu-Qir

The implementations of the planning principles discussed above are important in zoning and conceptual analysis. As an example to orient parks to fulfill all requirements and needs concluded throughout the previous studies an Eco-Park proposal has been designed and is briefly shown below.



Figure 11 Eco-Park Site Plan

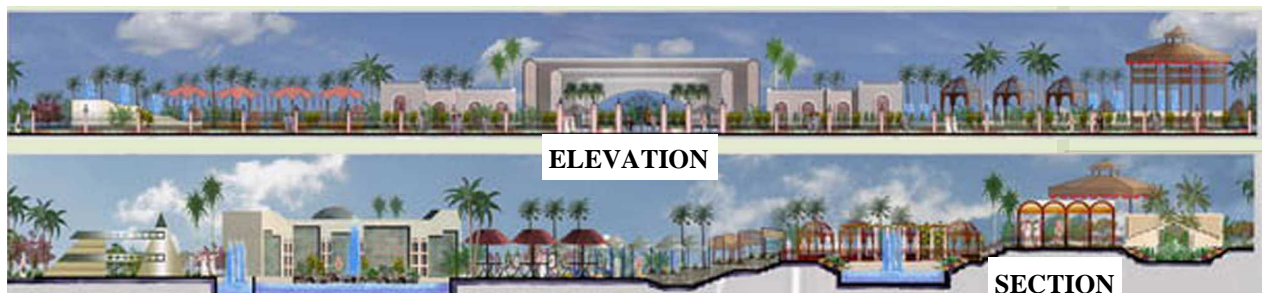


Figure 12 Main Elevation and Longitudinal Section through the Park

Eco Park Concept: Aim to change the situation by encouraging urban planning to transform vacant lots to Eco-Parks, bringing a range of economic, social and environmental benefits to local community and optimizing the sustainable use of resources. Different renewable energy sources are used within the Eco-park to create energy as seen in the concept analysis presented in Figure 13.

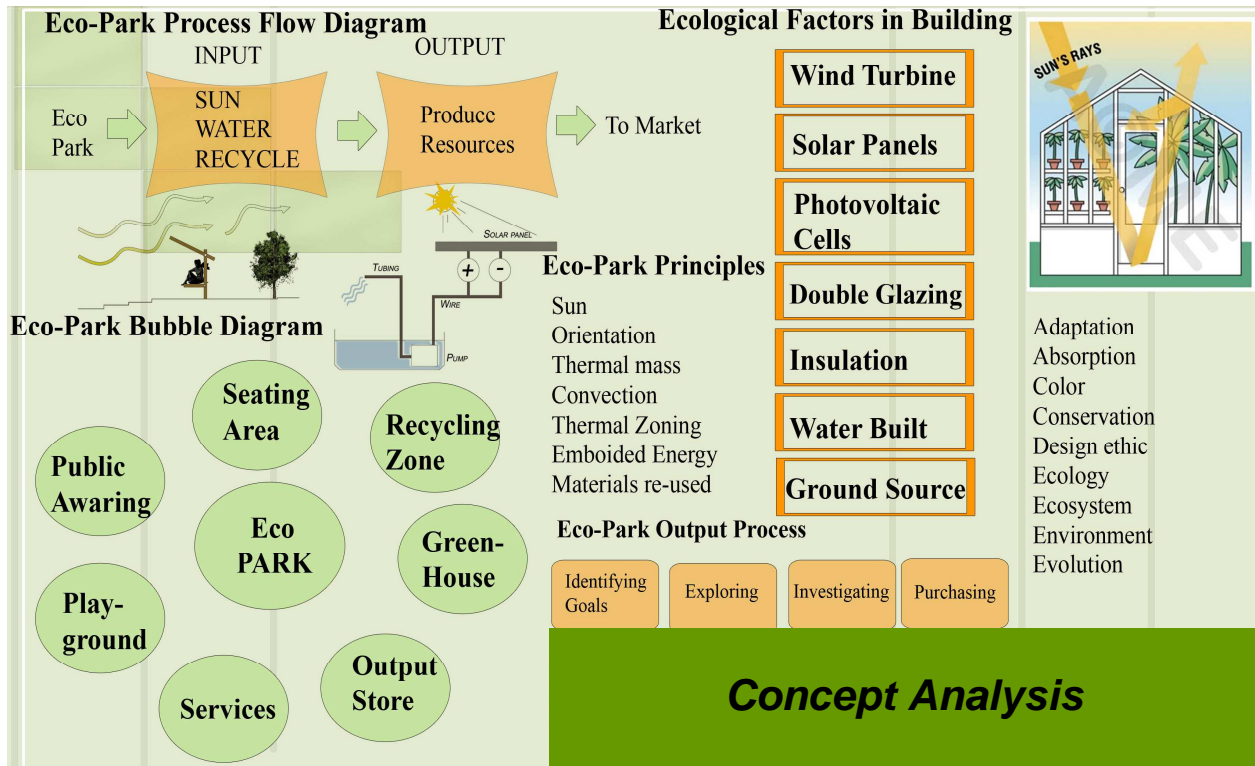


Figure 13 Abu-Qir Park Concept Analysis

Public awareness in Eco-Park through:
 Eco- Tour: Educational Tour
 Nature Facility Study: Implementation
 Nature Observation Facility: Accessing
 Theme Gardens: Specifically



Figure 14 Public Park

The eco-park is envisioned to include a range of sustainable and restorative uses related to organic agriculture, biotechnology, aquaculture, and 'living machine' technology. The living machine utilizes living plants to complete the chemical conversion to turn liquid organic waste from the food industry into viable products such as fertilizer and fish food.

Solar Panel Fountains: Run directly from solar panels they work when there is sufficient sunlight, the brighter the sun the greater the flow. Converting light energy to electrical energy, this is educational observation in itself shown in Figure 15.

Curved Solar Panels: A mirror alignment measurement device, which should make these parabolic mirror solar collection systems more affordable and efficient shown in Figure 15. Theoretical orthographic (TOP) technology is able to quickly and relatively easily evaluate the alignment of mirrors in a parabolic trough power plant and prescribe corrective measures.



Figure 15 Curved Solar Panels and Solar Panel Fountains

8. Conclusions

Abu-Qir has very significant historical background which can increase from its value and assist its development. Abu-Qir can be a very important point of attraction due to its location locally and internationally. It has moderate climate which increase its touristic potential all over the year. Sea water is one of the main potentials of that area which can increase economical and natural resources by using it in recreational projects. Abu Qir forms a perfect site for the development of an Eco-Park that serves Alexandria, Abu-Qir and the whole Mediterranean region.

If urban parks can evolve from their current, primarily recreational role, into a new role as a catalyst for community development and enhancement, Eco-Parks will be an essential component in transforming and enriching our cities. Its goals are restoration of natural ecosystem and utilization of ecological potentials by using renewable sources of energy such as solar energy, wind energy, hydropower and geothermal energy. There is no such international model for Eco-parks, and it is our mission as Egyptian Architects to find the optimum Eco-Park solution that fits our environment, heritage and culture.

Abu-Qir Eco-Park is intended to be a demonstration of the principles of sustainability which will help to safeguard the environment into the 21st Century. The Eco-Park presented in this paper is designed to provide a stimulating and educational environment for the visitors and people of Alexandria and Abu-Qir, as well as working as a tourist magnet Through Abu-Qir Eco-park, it is required to demonstrate that sustainable living is not something new and cutting-edge, needing a huge effort and an immense budget. The Eco-Park is a combination of cost-effective, renewable and applied energy saving and sustainable principles.

After Site analysis approaches and containment, characteristics, specific treatment to the park was solved to reach maximum energy conservations. Ecological Park in such area will increase the public awareness of the residents about the serious problems of global warming and climate change and how to minimize the use of electricity. Eco tours could take place and educational seminars to aware the people of specific definitions to allow them to implement these conditions on daily basis.

References

1. E.M. Forster; Alexandria a History and a Guide, 1922.
2. Abdel Aziz Okbah M. Bioavailability of phosphorus in Abu Qir Bay and Lake Edku sediments, Mediterranean Sea, Egypt . Chemistry and Ecology, Taylor and Francis Ltd 2006 Dec; Volume 22 (Number 6): pp. 451-62(12).
3. Saad PC. Writings for acquisition: Hellenizing Alexandria, Egypt [Massachusetts Institute of Technology: Massachusetts Institute of Technology, Dept. of Architecture, 2005. Thesis (S.M.).
4. Freeman C. Egypt, Greece and Rome (Civilizations of the Ancient Mediterranean); Oxford University Press, ISBN 0-19-815003-2, 1996.
5. James G. Titus. Chapter 1: Sea Level Rise And Wetland Loss: An Overview, 20460.
6. Green Building Bible: In Depth Technical Information and Data on the Strategies and Systems Needed to Create Low Energy, Green Buildings. The Perfect Companion to the Green Building Bible, volume 1. The Low Energy Design Technical Reference. 3rd Edition; Green Building Press.
7. SPUR Citizen Planning Committee; Ecological Parks - Green Buildings: Bringing Environmentally Sensitive Design to San Francisco. SPUR-San Francisco Planning and Urban Research Association 396.
8. Lowe EA, Warren J. The Source of Value: An Executive Briefing and Sourcebook on Industrial Ecology. Richland, Washington: Battelle Pacific Northwest Library, 1996.
9. PCSD (President's Council on Sustainable Development). Eco-industrial Park Workshop Proceedings; 1996; Oct 17-1996 Oct 18; Cape Charles, VA. 1996.
10. UNEP, Mediterranean Action Plan. Mediterranean Strategy for Sustainable development: A framework for Environmental Sustainability and shared prosperity. 2001.
11. Roaf S, Fuentes M, Thomas S. Eco-house 2: A Design Guide. Architectural Press, 2001
12. Green Building Bible: Essential Information to Help You Make Your Home and Buildings Less Harmful to the Environment, the Community and Your Family. 3rd Edition, volume 1; Keith Hall.
13. SANILLES Thermal Spa and Eco Park; Sanillés is a Health Education and Sustainable Living project in the Spanish Pyrenees; [Web Page]. Available at <http://www.sanilles.com/>. (Accessed 2007 Sept.).
14. Eco-Park is part of the Wildlife Trust for Birmingham & the Black Country. Birmingham Eco-Park [Web Page]. Available at <http://www.wildlifetrust.org.uk/urbanwt/EcoPark/framepage.htm>. (Accessed 2007 Aug).