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SU INSEDIAMENTI E AMBIENTE

RIVISTA INTERNAZIONALE  
DI CULTURA URBANISTICA

02

# il paesaggio

nella storia  
nella cultura  
nell'arte e nella  
progettazione urbanistica

assunti teorici ed esperienze



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DI NAPOLI FEDERICO II  
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**Edizione**

ESI Edizioni - Via Chiatamone, 7 - 80121 Napoli

Telefono +39.081.7645443 pbx - Fax +39.081.7646477

Email [info@edizioniesi.it](mailto:info@edizioniesi.it)

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Zerouno | [info@zerounomedia.it](mailto:info@zerounomedia.it)

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### Rubriche

## Forme Urbane Naturali Il lago Mariout, Scenari di degrado e prospettive di sostenibilità

di Yasser AREF & Mohamed MEHAINA

L'espansione urbana di Alessandria è stata largamente determinata dalla presenza di due caratteristiche naturali; il Mediterraneo e il Lago Mariout. Le attività turistiche e di svago sono concentrate sul lungomare mediterraneo di Alessandria, mentre l'industria e gli impianti di trattamento degli scarichi sono distribuiti intorno al Lago Mariout.

In contrasto con piani e strategie finalizzate alla conservazione del lago, tuttavia, la diffusione insediativa, l'inquinamento industriale e le acque di scarico non trattate stanno determinando un grave impatto negativo sull'ecosistema del lago. Inoltre, la dimensione del lago è drasticamente diminuita nei decenni passati, a causa dell'occupazione del suolo e della pressione dell'urbanizzazione di una metropoli sovrappopolata.

Alla luce di tale situazione, il saggio esamina alcune questioni cruciali: qual è il futuro del lago? E come trovare un equilibrio tra la conservazione dell'ecosistema del lago e il necessario sviluppo urbano?

### Urban Natural Forms – Lake Mariot, scenarios of deterioration or prospects of sustainability.

Alexandria's urban expansion has been greatly determined by the presence of two natural features: the Mediterranean and Lake Mariout. Leisure and tourism are focused on Alexandria's Mediterranean waterfront, whereas industry and sewage plants are centered around Lake Mariout. Despite plans and strategies to preserve the Lake, yet, urban sprawl, industrial pollution, and untreated wastewater are having a severe negative impact on the Lake's ecosystem. Moreover, the size of the Lake has drastically diminished over the past decades due to land infill and the pressure of urbanization from an overpopulated metropolis.

According to the former situation, the paper debates very crucial questions: what is the future of the Lake?, and how to balance between preserving the ecosystem of the Lake, while making the necessary urban development?

### Formes urbaines naturelles

#### Le lac Mariout, scénario de dégradation ou perspectives de développement durable du territoire

Le développement urbain d'Alexandrie a été considérablement influencé par la présence de deux éléments naturels: la mer Méditerranée et le lac Mariout. Les loisirs et le tourisme se situent sur le front de mer méditerranéen d'Alexandrie, alors que les implantations d'évacuation des eaux usées et les industries se concentrent autour du lac Mariout. Pourtant, malgré les plans et les stratégies pour le préserver, l'extension urbaine, la pollution industrielle et le manque de traitement des eaux usées sont en train d'avoir un grave impact négatif sur l'écosystème du lac. De plus, ses dimensions ont radicalement changé au cours des dix dernières années, à cause du remplissage de son bassin et de la pression urbaine exercée par une métropole surpeuplée.

Sur la base de telles données, le journal ouvre un débat sur des questions cruciales: comment s'annonce l'avenir pour le lac? Et comment équilibrer la sauvegarde de son écosystème avec un développement urbain devenu nécessaire?

## **Urban Natural Forms**

### **El Lago Mariout, Escenarios de Deterioro o Perspectivas de Sostenibilidad**

La expansión urbana de Alexandria ha sido mayoritariamente determinada por la presencia de dos características naturales: el Mediterráneo y el Lago Mariout. Actividades de ocio y turismo se concentran en las orillas del Mediterráneo, mientras que las industrias y las plantas de tratamiento de aguas residuales están alrededor del lago. A pesar de proyectos y estrategias para la preservación del lago, la expansión urbana descontrolada, la contaminación industrial y las aguas residuales no tratadas están afectando muy negativamente el ecosistema del lago. Además, las dimensiones del lago se han reducido drásticamente a lo largo de las últimas décadas debido a la edificación de relleno y a las presiones de una metrópolis superpoblada. A la luz de esta situación, el artículo debate cuestiones cruciales: cuál es el futuro del Lago? Como se puede encontrar un equilibrio entre la preservación del ecosistema y el imprescindible desarrollo urbano?

## **Natürliche Stadtformen.**

### **Mariout, Szenen des Verfalls oder Hoffnung auf Erhaltung.**

Alexandrias Stadtausdehnung ist groesstenteils festgelegt worden durch zwei Naturelemente: das Mittelmeer und den Mariout See.

Erholung und Tourismus konzentriert sich an Alexandrias Mittelmeerküste, während Industrie und Abwassergräben um den Mariout See gelegen sind. Trotz vieler Pläne und Strategien, den See zu erhalten, haben Stadtausdehnung, industrielle Verschmutzung und Abwasser einen sehr negativen Einfluss auf das Ökosystem des Sees. Ausserdem hat sich der See während der letzten Jahrzehnte wegen der Landansammungen aus dieser überbevölkerten Grossstadt dramatisch verkleinert. Das Essay debattiert die sehr schwierige Frage: welches ist die Zukunft des Sees? Und wie kann man ein Gleichgewicht finden zwischen der Erhaltung des Ökosystems und der notwendigen Stadtentwicklung?

## Urban Natural Forms. Lake Mariout, Scenarios of Deterioration or Prospects of Sustainability

*Yasser AREF & Mohamed MEHAINA*

*The Alexandria and Mediterranean Research Center Bibliotheca Alexandrina<sup>1</sup>*

### 1 Introduction

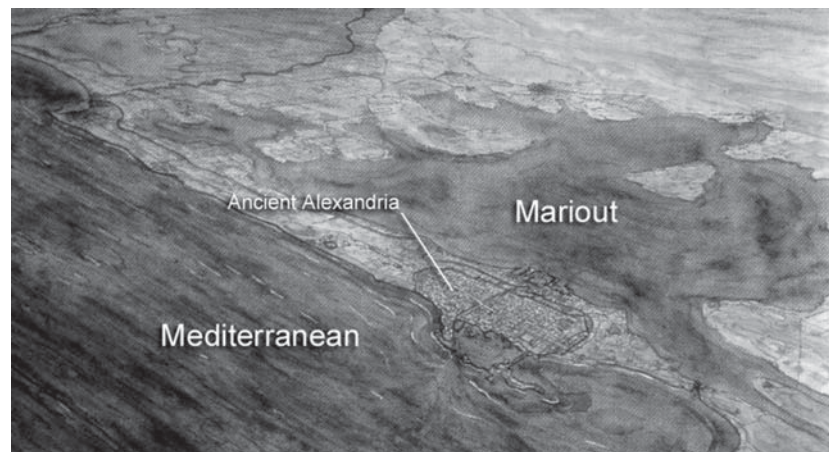
Man settled beside water bodies since ancient ages. Now with modernization and urbanization and cementization, the need to re-relate to nature is important. Waterfronts increase the land value of lots and parcels of land surrounding it; it attracts activities and business and creates new urban nodes and for recreation and entertainment that appeals to local residents and visitors to the city, thus adding to the local economy resulting in increasing revenues. This is not to mention the sociological effects on the residents. Moreover, on the environmental level, waterfronts stabilize the natural eco balance of the area.

### 2 Lake Mariout, from antiquity to modernity

Being in existence through ages, Lake Mariout is one of the major lakes in north Egypt. Forming the southern boundary of the city of Alexandria, west of the Delta, it lies along the Mediterranean coast with total length of 64 Km, total area of 178 km<sup>2</sup> and ranges in depth from 1-3 meters.<sup>2</sup>

Figure 1: Lake Mariout in Ancient Alexandria

Source: Jean-Eves Empereur, *Alexandria Rediscovered*, British Museum Press 1998, p. 40



The significance of the lake dates back to, two thousand years ago, in 332 BCE, Alexander, chose the strip of land between the Mediterranean Sea to the north and Lake Mariout to the south, to build his new city, Alexandria. Since then, the city's development has been greatly

<sup>1</sup> The views displayed in this paper are those of the authors and do not represent the official view of Bibliotheca Alexandrina.

<sup>2</sup> Alexandria Lake Mariout Integrated Management, Stocktaking Analysis (a), Background Materials, 3rd draft, unpublished report, ALAMIM Project, September 2007, pp. 3-8.

determined by the presence of these two natural features. In fact; one of the reasons of Alexander's choice of this location was the existence of Lake Mariout, being a huge natural water body defending enemies from the south. At that time, the lake covered an area of approximately 700 km<sup>2</sup>. The width of the lake was estimated by 24.5 Km while its length was about 44.5 km.

In late 1930s, the Property Authority started reclaiming over 620 feddans from the lake to establish two farms named Qalaa farm and the Soubhia farm. The success of these farms has encouraged the local authorities to reclaim another very large portion of the lake after the revolution in 1952. During 1953-1955 about 23,000 feddans were converted into agricultural land named Abbas.<sup>3</sup> Until the 1980s most of the city's domestic sewage and industrial wastes were discharged directly into the Mediterranean through a number of outlets. Consequences included the pollution of beaches and threatening of marine life. The color, odor and clarity of the seawater were also affected. The Governorate of Alexandria therefore decided to divert this untreated, raw sewage to Lake Mariout in addition of the agricultural drainage. Again, this provoked a natural, environmental, economical and social disaster as the lake's water is stagnant. Since 1993, the sewage water has been sent to the newly constructed sewage treatment plants. Yet, unfortunately these plants consist only of primary treatment facilities and the primary effluents were still discharged into the lake.

### 3 The contemporary Lake Mariout

Today, the Lake is divided into two main parts by the road connecting the Desert highway and the Coastal International road at the 21 Km area. The eastern side is the lake itself, and the western side is the Mariout Valley. The eastern side is divided into 5 sub-basins by the Qalaa drain, Nubaria canal, the Alex-Cairo Desert highway and the Petrochemicals road. While the Mariout Valley is divided into 4 sub-basins by three parallel roads connecting the Alexandria- Borg el Arab road with the Coastal International road. The main focus of this paper is the Eastern side of the lake.

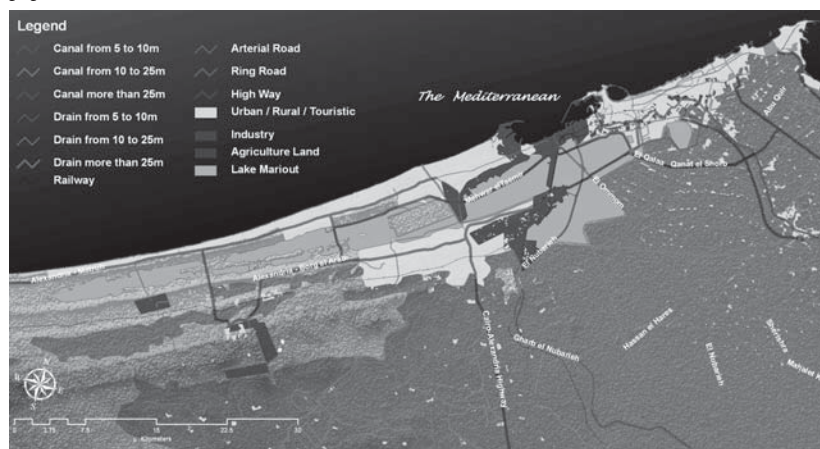


Figure 2: Lake Mariout in relation to urban Alexandria

Source: The authors

3 Alexandria Lake Mariout Integrated Management, Stocktaking Analysis (a), Background Materials, 3rd draft, unpublished report, ALAMIM Project, September 2007, p.3-8

## The lake as an urban feature

The current uses of the lake are:

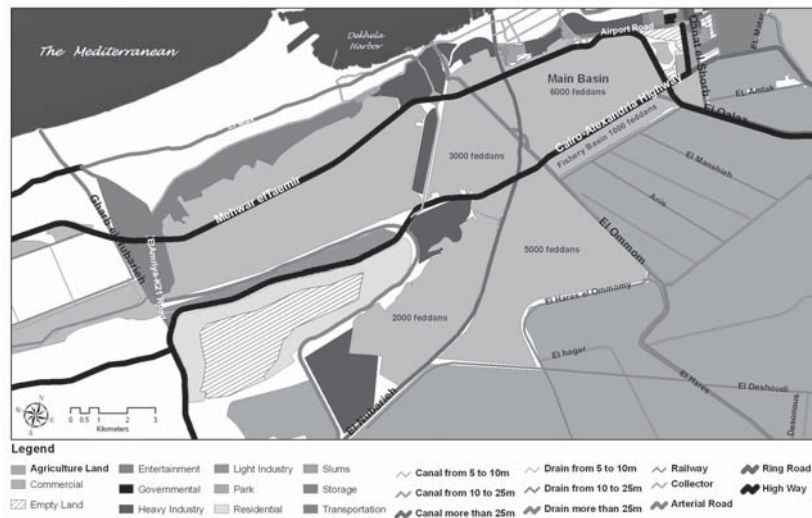
1. Salt lakes
2. Fisheries (fish farms)
3. Sewage for wastewater

Since the lake spreads out in a vast area south of Alexandria city, even after all the reclaimed and filled parts, Lake Mariout is surrounded by various land uses. These land uses can be listed in the following:

1. Heavy, light industries and storage
2. Housing
3. Salt marches
4. Commercial, recreational & entertainment
5. Agricultural
6. Vacant land

Figure 3: Current land uses around the lake

Source: The authors



#### 4 Scenarios of deterioration

With the current land uses around the lake and with the present utilization of the water body as mentioned above, in addition of the severe problems arising from bad management. If this scenario continues, this will definitely lead to a gloomy future for the lake. The problems facing the lake are:

1. Industrial pollution, which includes heavy metals and chemicals from surrounding factories.
2. Treated and untreated wastewater discharges which are estimated to about one million  $\text{m}^3/\text{day}^4$

4 Adel Abu Zahra Ed., Mariout Behaira fi Khatar. Text in Arabic “Mariout, a Lake in Danger”, Alexandria Friends of the Environment, 2000, p. 43.

3. Agricultural drain.
4. Land infill to give space to different developments.
5. Decentralized responsibilities. The official responsibility of safeguarding the lake is widely dispersed among several governmental agencies such as, Ministry of Agriculture, the Governorate of the Alexandria, the Egyptian Environmental Affairs Agency. In addition, a considerable part of the lake is physically located in the governorate of Behaira rather than the governorate of Alexandria.
6. The division of the original lake into several basins due to the construction of roads, canals and drain channels. Moreover, the lake has no source of fresh water and the connection with the sea is not sufficient to assure the turnover of the water of the lake.



Figure 4: Current view of the lake

Source: The Alexandria and Mediterranean Research Center, Bibliotheca Alexandrina

## 5 Current issues related to the lake

### *Fisheries*

Fish production from Lake Mariout in 1970s was over 7,000 tons per annum. However, it was reported that there is evidence of high levels of metals in the fish.<sup>5</sup> Since the beginning of 1980's the fish production in Lake Mariout began to decrease rapidly due to:

- The constant increase of industrial wastes and sewage drained into the lake.
- Overfishing, and the use of illegal fishing methods.
- Scarcity of methods to promote the fishery upturn.
- The widespread of reeds.
- The continues decrease in the lake's surface area due to ongoing land filling.

### *The continues need for urban expansion*

According to the 2006 census Alexandria's population is about 4,200,000 residents. With high birth rates and continues immigration from rural areas, Alexandria's population is expected to increase rapidly in the coming few decades. This gives urban pressure to provide

<sup>5</sup> Initial Environmental Impact Statement for the Alexandria Wastewater Master Plan Study, 1978.

land for housing and commercial projects. The city is enclosed between the Mediterranean and the Lake Mariout and agricultural land to the East, and the desert to the west. The infilling of the lake gives a way to provide this land for urban development.

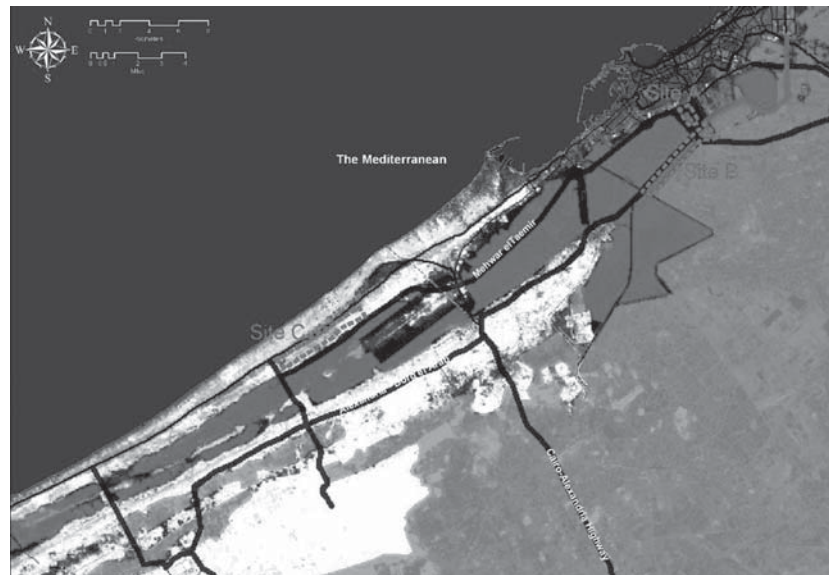
## 6 Official visions

Over the last several decades there has been many studies concerning the lake. The studies were conducted by national and international organizations. Several conferences were also tackling the future of the lake. The problem with these studies is that they were not taken seriously by the decision makers, therefore recent studies tried to involve the Governorate of Alexandria as a partner in the decision making process.

In 2005-2006, the Governorate of Alexandria with the help of the World Bank started a project to develop the area around the lake with areas to be filled in the lake itself. As with the change of the governor of the city and with the new vision of the new governor another approach was adopted and a design competition was announced in 2007 to develop 3 areas around and in the lake. These 3 development projects, “New Alexandria” as entitled by the governorate, were recently approved by the Egyptian Prime Minister, according to the official website of the governorate of Alexandria.<sup>6</sup> These several approaches indicate the uncertainty in handling the case of the lake, as well as the change of the future of the lake with the change of the political vision being the decision maker, which finally threaten the lake.

Figure 5: The location of the 3 proposed areas for development by the government of Alexandria.

Source: The authors



A very crucial question arises: Does the governorate know what is the integrated future of the lake and the surrounding area? In order to answer this question it is essential to review the previous and future master plans of the city.

<sup>6</sup> [www.alexandria.gov.eg](http://www.alexandria.gov.eg)

## 7 The lake in official master plans of Alexandria

### *Master Plan of 1921 (The Maclean Plan)*

Maclean in his plans stated that the future expansion of the city should be along the strip of land enclosed between the sea and the lake, because according to his views, if some parts or the whole lake is dried, the reclaimed land will be more appropriate for agriculture than for construction.<sup>7</sup> This indicated that the idea of drying the lake was an option discussed since that time.

### *Alexandria Master plan 2005*

The plan of Alexandria 2005 was prepared in 1982, by a group of experts from the University of Alexandria and Liverpool University. Even though the plan of 2005 acknowledged the threats to the lake such as land infilling, industrial pollution, discharging untreated sewage, and assured the necessity to preserve and protect the marine life of the lake, and encourage the expansion of using the lake for fishing, the plan of 2005, proposed that parts of the lake might be in filled or reclaimed as one of the solutions to provide land for urban development projects the city. The plan stated that the lake can be used in a number of complementary, not alternatively, uses which are:<sup>8</sup>

- Sustaining the use of the lake as a fishery.
- Completion of the industrial waste treatment projects
- Providing places for the population increases.

### *Alexandria Master plan 2050*

This master plan prepared by the Governorate of Alexandria highlighted several points related to the development of the lake. These points are:<sup>9</sup>

1. The utilization of Lake Mariout as a fishery, in addition to using the vacant areas surrounding the lake in touristic and entertainment activities after making the necessary environmental treatments to the lake itself.
2. To meet with the rapid increase of population new, settlements should be proposed in the areas south east of Alexandria without land filling the lake.
3. Preserving the natural assets and making the best use of existing potentials without harming the environment.
4. The Lake Mariout should be integrated in tourism planning strategies and a separate organization should be responsible for the management of the lake.

It is clear from reviewing the master plans of the city, that the notion of utilizing the lake has always been discussed, even the idea of drying some parts of the lake to provide space for urban expansion or space for agriculture. From the authors' point of view, the need for financial recourses, combined with the urban pressures, push the Governorate of Alexandria

<sup>7</sup> City of Alexandria Town planning Scheme, by Maclean 1921, p. 3.

<sup>8</sup> Comprehensive Master Plan Project Alexandria 2005 Final report, Alexandria Governorate, January 1984, p. 186-187.

<sup>9</sup> Alexandria Master Plan 2050, prepared by the Governorate of Alexandria and the general Organization of Physical Planning, with the cooperation of the Alexandria University, April 2004, p. 171.

towards utilizing the Lake to its fullest extent, and as a result sacrificing the integrity of the natural environment.

## 8 Recommendations

The aim of the proposed vision is to look at the prospects of the lake, with special attention to the area facing urban Alexandria, taking into account the current situations, conditions and constraints. In order to have a realistic point of view the several forces that direct the future of the lake should be put into consideration.

These forces are:

- Safeguarding the ecosystem of the lake.
- The need for urban expansion.
- Improving local economy.

The vision should adopt the following strategies:

- It will not be realistic to suspend the development plans proposed by the Governorate of Alexandria. Some of these areas are now enclosed and shallow, waiting to be filled, such as site A. Keeping this site undeveloped will not retrieve it to be part of the lake again.
- The already existing industries surrounding the lake should be environmentally friendly, in terms of their waste discharges. It will not be economical and logically feasible to relocate these factories.<sup>10</sup>
- Restudying, technically and economically the alternative of using the discharged wastewater to irrigate agricultural land rather than dumping it into the lake. This project will result in large financial revenues from these agricultural lands and at the same time minimize the pollution of the lake. Although there is a current project to upgrade the exiting eastern and western treatment plants from the primary to secondary treatment.<sup>11</sup>
- For improving the lake water itself, a study should be conducted to enhance the water quality by chemical treatments or by making an opening with the sea to make the water running, or any other alternative.
- Utilizing the lake's waterfront for touristic, and entertainment activities that will add to the local economy of the city.<sup>12</sup>
- Site B of the proposed development and the main basins of the lake should be remained as natural water bodies, and should be used as fisheries.

10 It worth noting that Egyptian Environmental Affairs Agency is conducting the EPAP II project, which is led by the World Bank with the objective of treating air emissions and industrial wastewater by providing technical and financial assistance to various industries.

11 The concept was discussed during the early 80's where the two alternatives dumping Alexandria waste water into the sea or to the land and use it for reclaiming agricultural Land. The studies, which was part of USAID eventually selected to Kadeyat Magari Al Iskandariah, "text in Arabic" The case of Alexandria's Waste Water" October 1991.

12 Saad El Din Wahba, Adou El Shaab, text in Arabic, "Enemy of the State", Al Fagr Publishing Co. 1996, p. 57-58

- Creating new settlements south west of Alexandria can solve the population increase, however, Alexandrians are related to their urban city, and don't prefer being allocated out. It is proposed that the industrial factories along the Mahmoudieh Canal can be transferred to a greater industrial complex out of the city. This can be achieved through the government by supplying the factories owners by equivalent space and the required infrastructure in addition of some tax deductions. This initiative will not only clean the city from the harmful industries but will provide huge areas for housing development south of the city, but also will give these industries the opportunity to rebuild their factories with environmentally oriented technologies.<sup>13</sup>

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<sup>13</sup> Actually the total area of existing industries around the lake is more than 6 million square meters, from these about a million and half square meters factories that aren't active and their owners are just waiting for the land price to increase more and more. In the case of reallocating the existing industries along the Mahmoudieh Canal, and if suggested that the built up area is 60 %, and the surface area of each apartment is 120 m<sup>2</sup> and the number of floors is 7, then housing will be provided for about 900,000 citizen if all the industries were allocated. If only the not active industries were reallocated then about 220,000 citizens would be provided with housing. Taking into account that the population increase in Alexandria is estimated by about 60,000 person annually.