

# ALEXANDRIA EMBRACING THE SEA

## INTEGRATING COASTAL PROTECTION AND ECONOMIC DEVELOPMENT

### PROJECT OBJECTIVE

"Find innovative solutions to combine coastal protection with other (potential) functions of the coastal region."

### COASTAL EROSION

Most of the Alexandria coastline suffers from erosion problems. Erosion occurs along most of Alexandria's beaches as a result of sediment starvation, coastal processes and sea level rise.

The width of the beaches decrease due to the eroding force of the waves and currents, which have an indirect impact on tourism.

### SOLUTIONS

In this master plan the following solutions are implemented on the coastline of Alexandria: *(more non implemented solutions can be found in the final report)*

- |                     |                        |
|---------------------|------------------------|
| 1 Artificial reefs  | 6 Wave energy barrier  |
| 2 Sand engine       | 7 Removable flood wall |
| 3 Sand nourishment  | 8 Permanent flood wall |
| 4 Second beach      | 9 Raising coastal road |
| 5 Submerged gabions | 10 Tunnel + promenade  |

### MASTER PLAN

The map shows an over view of the studied areas along the coast of Alexandria.

### ABOUT ALEXANDRIA

Alexandria is the second largest city in Egypt (4.6 million inhabitants), contains more than one third of the national industries and is considered as Egypt's principal seaside summer resort on the Mediterranean Sea.

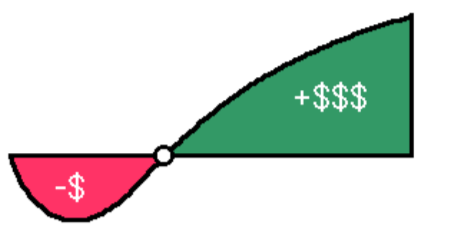


### SWOT, STAKEHOLDERS AND FINANCE

The current situation in Alexandria is analyzed by performing research and making a concluding SWOT analysis, combining the Strengths, Weaknesses, Opportunities and Threats of the area.

Erosion is a big problem along the whole coastline of Alexandria. It is a large coastal city with a large flow of tourism. However, foreign tourism has decreased after the revolution. By combining coastal development with tourism both water safety and the local economy can be improved.

Stakeholders for developing the coastal will both be public (municipality, national, etc.) and private (restaurant owners, project developers, museums, etc.). Financing the development can be integrated between both. It is necessary to create a dialogue with for instance both the municipality and cultural sector. Creating ideas together can make a big difference: 1+ 1 = 3!



### BENEFITS

The applied solutions will bring direct and indirect benefits to Alexandria, categorized this will be:

- |   |                         |
|---|-------------------------|
| A Economical benefits (direct / indirect) | D Sustainable benefits  |
| B Environmental benefits                  | E Natural Life benefits |
| C Cultural benefits                       | F Transport benefits    |



### LOCATIONS

The master plan is divided into five different areas, each with their own characteristics. The characteristics influence the type of solutions used on the specific locations and determine the possible future benefits. At the moment area I has the biggest erosion problem, and thereby will be developed first. The second area has a large potential combining tourism and economic development, and thereby is very interesting for future plan making.

<p><b>I</b> A B D E F</p>	<p><b>II</b> A B C E F</p>	<p><b>III</b> A F</p>	<p><b>IV</b> A D</p>	<p><b>V</b> A E</p>
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**General recommendations:** re-use of old materials, no structures (buildings) placed in the sea, maximal use of sand nourishment (soft coastal protection).

### FOCUS: SHORT TERM IMPLEMENTATION

#### I – Mandara Integrated Zone

- Re-use of coastal defence placed into gabions placed in the sea
- Beach creation and economic development
- Creation of natural habitat
- Safekeeping of transport flow during storms
- Converting wave energy into electricity



### FOCUS: LONG TERM VISION

#### II – Cultural and Tourism Bay

- Re-use of coastal defence placed into sea
- Beach nourishment and therefore economic development
- Expansion underwater cultural heritage museum
- Creation beachside promenade
- Environmental improvement by tunnelling the road (less air pollution)

