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English summary

Climate change is a long-term shift in the statistics of weather (including its averages). The last decade of the 20th Century and the beginning of the 21st have been the warmest period in the entire global instrumental temperature record, starting in the mid-19th century. It is well recognized that climate changes have already caused increases in average global temperatures and is expected to continue rising temperatures. As a result of continued temperature rising, it is expected to give rise to many important phenomena including sea level rise (SLR) and increase of frequency and severity of extreme events. Extreme events include heat waves, marine storm surges and flash floods the mean annual global surface temperature will increase by 1 to 3.5°C by the year 2100, Scientists predict the Mediterranean will rise by a range of 30 centimeters to one meter by the end of the century but still a one-meter rise in the level will possibly submerge important parts of Alexandria. **Human activities are releasing greenhouse gases** into the atmosphere carbon dioxide is produced when fossil fuels are used to generate energy and when forests are cut down and burned. Methane and nitrous oxide are emitted from agricultural activities. **Rising level of greenhouse gases** are already changing the climate. These gases control the way natural energy flows through the climate system. Climate models predicated that the global temperature will rise. **A large part of the growing human population in the world's** coastal zone is vulnerable to storm surges and other disasters. More than 2000 million people were estimated to be at risk from coastal flooding, a number to be tripled by the year 2100. The concept of vulnerability to impacts may be confusing but essential concept to understanding and responding to the integrated impacts of SLR on the coastal system. Vulnerability has been defined “the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. important indicators of coastal vulnerability include (number of people affected – number of people at risk- land area loss – capital values loss)**Global-mean sea-level rise** is one of the more certain impacts of human- induced global warming. Sea level changes are caused by several natural phenomena the three primary contributing ones are: ocean thermal expansion, glacial melt from Greenland and Antarctica in addition to a smaller contribution from other ice sheets- and change in terrestrial storage. Among those, ocean thermal expansion has been expected to be the dominating factor behind the rise in sea

level. It is predicted that with global warming, global average sea levels may rise by between 7 and 36 cm by the 2050s, by between 9 and 69 cm by the 2080s and 30–80 cm by 2100. The impacts of SLR will not be globally uniform, because of local variations in vertical crustal movements, topography, wave climatology, long shore currents, and storm frequencies. Low gradient coastal landforms most susceptible to inundation include deltas, estuaries, beaches and barriers land sand coral reefs. Regions at risk include the Low Countries of Europe eastern England, the Nile Delta in Egypt, the Ganges–Brahmaputra, Irrawaddy, and Chao Phraya deltas of south-eastern Asia, eastern Sumatra, and Borneo. In the United States, the mid-Atlantic coastal plain, the Florida Everglades, and the Mississippi delta will be particularly vulnerable. Developing countries are certainly identified as mainly at risk. The consequences of SLR for population location and infrastructure planning in developing countries should definitely be reviewed by the developing world. From the World Bank (WB) report Dasgupta has noted that Egypt is considered one of the top five countries expected to be mostly impacted with a -1m MSL in the world. Results from studies on various aspects of the impacts and possible response to SLR on the Egyptian coast indicate that a sizable proportion of the northern part of the Nile Delta will be lost to a combination of inundation and erosion, with consequent loss of agriculture land and urban areas. Furthermore, agriculture land loss occur as a result of soil salinization estimated that for a -1 m SLR, about 2,000 km² of land in coastal areas of lower Nile Delta may be lost to inundation.

The main objective of this study is to use modern techniques of GIS and surveys to properly identify risk areas in Abu Qir region.

- Collection, analysis and interpretation of available data and indicators on various spatial and administration sectors of the region.
- Buildup an accurate Digital Elevation Model (DEM) for Abu Qir region
- Identify vulnerable areas exposed to SLR.
- Suggest needed adaptation techniques.

Abu Qir Bay region is a part of Egypt located in the southern part of the Mediterranean is well known promising tourist, industrial and agricultural site. The coastal zone hosts important ecological habitats economic centers and agricultural resources. Lake Idku is an important sanction to migrating birds and aquaculture. However, development in the

region has been limited by low quality water resources due to excessive pollution and soil salinization which led to continuous deterioration of land productivity in the region. In addition lack of infrastructure, shortage of institutional capabilities and low awareness constitute strong obstacles against development in the region. It is lead to put Abu Qir one of the most regions affected to SLR. The main objective of this thesis is identify and assesses vulnerability of Abu Qir to MSL, Identify and discuss potential options for adaptation in Abu Qir Bay region. The methodology could be replicated with other similar regions suffering from the same limitations. High resolution satellite imagery combined with geographic information system GIS and ground based monitoring of coastal water quality are analyzed to identify high sensitivity areas in terms of excessive land use changes in the region. Pollution modeling and potential control have been carried to assess possibilities for sustainable development. GIS analysis is used to present an iterative plan for development of the region. The following steps are used to building GIS for Abu Qir region.

- Digital elevation model (SRTM) and contour elevation lines map
- Land use map (1:50,000 scale, (2011), Egyptian Survey Authority)
- Socioeconomic data: population, employment, distribution of population in different economic activities was obtained from (CAMPAS 2006)

After building GIS in study area, Abu Qir region is classified into High risk areas affected by SLR between -1m to -4m under MSL, Moderate risk areas between 0m to 3m above MSL and low risk areas between 3m to more than 3m above MSL based on DEM.

Results indicate high prospects of sustainable development of the region for industry and tourism by encouraging private business, development of institutional capabilities for infrastructure and upgrading of awareness. In particular, the following specific results have been obtained:

A detailed GIS has been established and the following analysis has been carried out:

- More than twenty layers of baseline data and maps of the region has been collected, verified and encoded.
- Sensitivity analysis has been carried out to identify and assess high sensitivity areas. It is found that 49% proximity of cultivated lands located in high risk areas between -4m to -1m under MSL, 26% proximity located in moderate risk areas between 0m to 3m above MSL and 25 % proximity located in low risk areas between 3m to more than 3m above MSL. It is found that 34% proximity of industries located in high risk areas and 66% proximity located in moderate risk areas. It is found that 5% proximity of residential areas

located in high risk areas, 40% proximity located in moderate risk areas and 55% proximity located in low risk areas. About services in Abu Qir region, it is found that 10% proximity of schools located in high risk areas, 75% proximity located in moderate risk areas and 20% proximity located in low risk areas. It is found that 84% proximity of hospitals located in moderate risk areas and 16% proximity located in low risk areas. It found that 75% proximity of health units located in moderate risk areas and 25% proximity located in low risk areas.

Results indicate high vulnerability and severe economic losses in Abu Qir region especially coast line in western study area suffering from erosion along most of Abu Qir bay. According to (El Raey 2010)¹⁹, the coastal cities of the Nile delta are seriously vulnerable to a SLR of 50 cm, which may result in population displacement of about 2.0 million. Study area exposure to sea level rise especially storm surges as a result increase in temperature. According to (El Sharnouby et al 2010), during the last few years, significant erosion occurs along most of Alexandria's beaches as a result of sediment starvation, coastal processes and sea level rise. According to (El Raey et al 2010)⁵⁰, a presumed sea level rise of only half a meter could diminish most of the region coast on Abu Qir bay. About a quarter of total lands cultivated with high quality dates will be inundated, apart from about one-third of the total urban area with its various urban land uses. Broad range of present population will suffer either due to loss of their residential shelter. It is found that the best recommended to SLR is alarm warning systems.

From analyzing the results of this study it could be concluded that

- Both temperature rise and the associated sea level rise associated with climate change could have serious impacts on Abu Qir region.
- The rapid growth of slum areas, located in villages to the south of the study area which is already highly vulnerable to the impacts of sea level rise, present a major vulnerability that could occur during the coming few decades without appropriate planning.
- Archeological sites represent one of the most valuable sensitive resources in Abu Qir region since most of these resources are located in low lying areas and are highly vulnerable to impacts of sea level rise either by inundation or by water logging.
- Agriculture and fishing sectors which present the first and largest economic sectors in Abu Qir region are also vulnerable to climate change and the people

working in these fields are exposed to loss of their jobs by any change in the climate.

- It is found that 49% proximity of cultivated lands located in high risk areas between -4m to -1m under MSL, 26% proximity located in moderate risk areas between 0m to 3m above MSL and 25 % proximity located in low risk areas between 3m to more than 3m above MSL.
- It is found that 34% proximity of industries located in high risk areas and 66% proximity located in moderate risk areas.
- It is found that 5% proximity of residential areas located in high risk areas, 40% proximity located in moderate risk areas and 55% proximity located in low risk areas.
- About services in Abu Qir region, it is found that 10% proximity of schools located in high risk areas, 75% proximity located in moderate risk areas and 20%proximity located in low risk areas.
- It is found that 84% proximity of hospitals located in moderate risk areas and 16%proximity located in low risk areas.
- It found that 75% proximity of health units located in moderate risk areas and 25% proximity located in low risk areas.

This study then gives an alarm on the serious impacts of SLR on Abu Qir, beaches and land losses, socioeconomic hazards and losses of culture heritage.

It is also recommended that:

1. Ministry of Manpower and Immigration adopts GIS techniques for collecting and analyzing changes of manpower data employment due to climatic and land use changes
2. Ministry of Manpower and Immigration upgrade its office in the region for vocational training and exploring job opportunities
3. Ministry of Investment to explore investment opportunities of the region to upgrade the economic situation
4. Upgrade awareness of the population of the region on risk reduction and adaptation options to climate changes and risk of sea level rise.

Appendix

Questionnaire on Abu Qir Region

- Name..... (Optional)
- Sex: Male Female
- Age: Under 21 21 – 30 31 – 40
 41 – 50 51 and above
- Province or governorate:
- Occupation:
- Do you have any extra job or profession?
 Yes what is this?
- No
- Marital Status
 Married Single Divorced Widowed
- Educational Status
 Read and write Can't read or write
 A university degree or higher
- Number of family members residing in a the same house ())
- Is there anybody in the family work abroad?
 Yes No
- Do you agree to travel illegally (illegal immigration)
 Yes No
- What do you think the risks associated with migration from your point of view?
.....

Lack of transportation

Unpaved roads

The lack of governmental transportation (Buses)

- Do winter storms affect any of the following?

Electricity sanitation streets
 the movement of vehicles Other

- Is there any NGOs providing services in the area? Does it have any significant role?

Yes No

- Are there any tourists in this region?

Yes No

- Does the rate was the same even before the revolution?

Yes No

- Do you know or hear anything about the problem of Climate Change? What is the extent of your knowledge?

.....

- Can you do any other work if your career affected by climate change?

Yes No

- Does the rise of the sea level could effect on the activities and crafts? And how?

Yes No

- What are the areas that most affected by the sea level rise from your view point?

.....

- Do services works with its full strength in severe winter storms?

Yes

No

- Do you expect a Tsunami like what happened in Japan with taking into consideration the difference between the ocean and the Mediterranean Sea?

Yes

No

- From your point of view do you think that there are any procedures or adequate preventive preparations to face these risks?

Yes

No

If the answer is yes what are the procedures and preparations that are available to address these potential risks?

.....

If the answer is no what are the procedures and preparations that you think necessary in order to confront these dangers?

.....

- Do you believe that there is sufficient awareness of these risks and how to deal with it or face it?

Yes

No

- What are your suggestions to confront this danger?

.....

- Where do you get your information?

T.V

Radio

Newspaper

Friends

Internet

Mobile services news

Other

Thank you

استبيان رأى

يهدف هذا الاستطلاع إلى رصد أهم المخاطر الطبيعية التي تواجه منطقة أبوقير و كيفية مواجهتها مما يؤدي إلى الحفاظ على الموارد الطبيعية و البشرية و البنية التحتية ضد هذه المخاطر المحتملة .
رأيك يساعدنا للوصول إلى رؤية أفضل لواقع المنطقة و لأفضل الإجراءات اللازمة للحفاظ عليها

- اسم المبحوث(اختيائى) :

النوع : ذكر () أنثى ()

محل الإقامة :

رقم المنزل :

رقم الشارع:.....

الحى:..... القسم أو المركز :

محل الميلاد: محافظة الاسكندرية () محافظة البحيرة () أخرى ()

محل الميلاد للعائلة :محافظة الاسكندرية () محافظة البحيرة ()

العمر : أقل من ٢١ سنة () ٢١ - ٢٥ () ٢٦ - ٣٠ ()

٣١ - ٤٠ () ٤١ - ٥٠ () ٥١ - فأكثر ()

المهنة :

هل تمارس مهنة إضافية :

نعم () ما هي لا ()

الحالة الاجتماعية :

الحالة التعليمية :

نوع السكن : مستقل () مشترك ()

عدد أفراد الاسرة المقيمين فى سكن واحدة:.....

ما هي الموارد البيئية فى منطقة ابو قير؟

سياحية

صناعية

زراعية

هل يقيم احد الابناء المتزوجين فى الاسرة فى نفس السكن ؟

نعم () لا ()

هل يعمل احد أفراد الاسرة المقيمين فى نفس السكن خارج ابو قير ؟

نعم () لا ()

هل يعمل أحد أفراد الاسرة خارج الوطن ؟

نعم () لا ()

الخدمات العامة التى تحتاجها المنطقة ؟

نقطة شرطة نعم () لا ()

نقطة مطافئ نعم () لا ()

مكتب بريد نعم () لا ()

مكتب سنترال نعم () لا ()

مخابز نعم () لا ()

مركز توزيع بوتاجاز نعم () لا ()

مركز تنظيم الاسرة نعم () لا ()

الخدمات الصحية التى تحتاجها المنطقة

مراكز تنظيم الاسرة نعم () لا ()

الصيدليات نعم () لا ()

وحدة الاسعاف والطوارئ نعم () لا ()

مراكز رعاية الطفولة نعم () لا ()

العيادات الخاصة نعم () لا ()

أنواع المدارس التى تحتاجها المنطقة ؟

..... & &

بعض المشكلات التى توجد بالمنطقة التى يقع فيها المسكن .

..... & &

مصادر التلوث البيئي التي تعاني منها الاسرة ؟

- | | | |
|-----------------|---------|--------|
| الضوضاء | نعم () | لا () |
| مياة الشرب | نعم () | لا () |
| القمامة | نعم () | لا () |
| عوادم المصانع | نعم () | لا () |
| المجارى | نعم () | لا () |
| الاطعمة الملوثة | نعم () | لا () |

هل هناك جمعيات أهلية تقدم خدمات بالمنطقة ؟

- نعم () لا ()

ما هي الخدمات التي تقدمها الجمعيات ؟

هل تواجه الاسرة مشكلات بيئية فى المجالات التالية ؟

- | | | |
|--|---------|--------|
| تدهور الاراضى الزراعية | نعم () | لا () |
| عد توفر المستلزمات الزراعية بالصورة المناسبة | نعم () | لا () |
| التلوث عن طريق المبيدات | نعم () | لا () |

هل تعرف أو تسمع عن مشكلة التغيرات المناخية (التغير فى حالة الجو او ارتفاع سطح البحر) وما هي مدى معرفتك بهذه المشكلة ؟

هل تستطيع ممارسة مهنة أخرى فى حالة تأثر مهنتك بالتغيرات المناخية ؟

هل تلاحظ التغيرات المناخية فى منطقة ابو قير ؟

هل تلاحظ ارتفاع مستوى سطح البحر فى منطقة ابو قير ؟

هل يؤثر ارتفاع مستوى سطح البحر على حرفة الصيد او حرف اخرى وكيف يؤثر ؟

.....
ما هي أكثر المناطق التي تتأثر بارتفاع مستوى سطح البحر ؟

.....
هل تعمل الخدمات بكامل قوتها في حالة حدوث الموجات الشديدة للشتاء ؟

.....
ما هي أكثر الخدمات تأثراً بهذه الموجات ؟

.....
هل تتوقع حدوث تسونامي (البحر يخرج على المدينة بشكل كبير) كما حدث في اليابان مع الفارق ما بين المحيط والبحر الأبيض المتوسط ؟

.....
هل ترى أن هناك إجراءات و استعدادات وقائية كافية لمواجهة هذه المخاطر

نعم () لا ()

إذا كانت الإجابة بنعم ... اذكر الإجراءات والإستعدادات المتوفرة لمواجهة هذه المخاطر
المحتملة

.....
إذا كانت الإجابة بلا .. ماهي الإجراءات و الإستعدادات التي تراها لازمة من أجل مواجهة هذه
المخاطر

.....
هل ترى أن هناك وعى كافي بهذه المخاطر و كيفية التعامل معها و مواجهتها

نعم () لا ()

إذا كانت الإجابة بلا ... ما هي اقتراحاتك للوسائل اللازمة لنشر الوعي الكافي بهذه المخاطر
المحتملة و كيفية التعامل معها

.....
ما هي مقترحاتك لمواجهة هذا الخطر

الملخص العربي

تتوافر اليوم أدلة توضح أن ارتفاع متوسط درجة حرارة الكرة الأرضية وما سيصاحبه من ارتفاع في سطح البحر سيكون له أثر كبير على النظم البيئية على سطح الأرض، بينما يرى البعض أنها قد تكون مفيدة بينما يرى البعض الآخر أنها ستكون ضارة. فمثلاً بينما قد تزيد الإنتاجية البيولوجية للغابات وبعض المحاصيل فإن بعض المحاصيل الأخرى قد تتدهور إنتاجيتها. كذلك بينما قد تزيد الأمطار (وبذلك مصادر المياه) في بعض المناطق في العالم فإنها قد تشح في بعض المناطق الأخرى - خاصة في المناطق القاحلة وشبه القاحلة - مسببة مشاكل كبيرة في موارد المياه.

بالإضافة إلى ذلك يقول البعض أن ارتفاع درجات الحرارة في العالم سيعجل بارتفاع سطح البحر (IPCC 2014) وأن هذا الارتفاع سيؤدي إلى غرق بعض الجزر المنخفضة والمناطق الساحلية وسيؤدي إلى تشريد الملايين من البشر وإلى خسائر اقتصادية واجتماعية فادحة. ففي الهند مثلاً قدر أن حوالي ٥٧٠٠ كيلومتر مربع من المناطق الساحلية سوف تتعرض للغرق مما سيؤدي إلى هجرة ٧.١ مليون شخص. وفي فيتنام قدرت الخسائر التي قد تنجم عن ارتفاع سطح البحر بحلول عام ٢٠٧٠ بحوالي ٢ مليار دولار. في حين أن البعض الآخر يقول أن ما سيحدث هو انخفاض في سطح البحر وإحتمال لعصر جليدي جديد. ويوضح الفريق الحكومي الدولي المعنى بتغير المناخ في تقريره الأخير أن التغيرات المناخية المحتملة ستختلف في تداعياتها من قارة إلى أخرى، ومن منطقة إلى أخرى داخل نفس القارة.

فعلى مستوى السواحل الأفريقية سوف يؤدي ارتفاع مستوى سطح البحر إلى غمر أجزاء كبيرة من المناطق الساحلية المنخفضة في شمال أفريقيا، وخاصة شمال دلتا النيل، وفي الجزء الأوسط من غرب أفريقيا. وسينتج عن هذا فقدان مساحات من الأراضي الزراعية والمنشآت المختلفة، كما سيؤدي أيضاً إلى التأثير على إنتاجية الأراضي الزراعية المجاورة، لزيادة ارتفاع منسوب المياه المالحة. ومن المتوقع أن تؤدي التغيرات المناخية في القارة الأفريقية إلى زيادة وتغير أنماط هجرة السكان تجنباً لما سيحدث من جفاف واطار أخرى، وسوف يترتب على هذا إندفاع التجمعات البشرية إلى هجرات عن أماكنها المعتادة، بما ينشأ عنه نماذج اجتماعية لم تكن معتادة وبالتالي تتغير أنماط الاستيطان والسياحة والصناعة والنقل والصحة وما يتبع ذلك.

وستكون للتغيرات المناخية العالمية آثار متنوعة في مصر على قطاع الزراعة والموارد المائية ، وعلى المناطق الساحلية والأراضي الرطبة في شمال الدلتا وسيناء ، وكذلك على المناطق الساحلية وما تحتويه من شعب مرجانية في البحر الأحمر. بالإضافة الى هذا ستكون للتغيرات المناخية آثار متعددة على صحة الانسان والنظم البيئية.

الآثار المحتملة للتغيرات المناخية على المناطق الساحلية

المناطق الساحلية التي توجد فيها ضغوط سكانية بشرية هامة، معرضة بشدة لتأثيرات تغير المناخ وستؤدي هذه التأثيرات إلى تفاقم الكثير من المشاكل الراهنة. من ذلك، مثلاً، أن الأنشطة البشرية أدت إلى زيادة هبوط الأرض في كثير من المناطق الدلتاوية وذلك من جراء تزايد كميات المياه الجوفية المسحوبة وتجفيف تربة الأراضي الرطبة وتخفيض كميات الترسيبات النهرية أو إيقافها. وستتسارع وتيرة كل المشاكل المتعلقة بالفيضان وتملح المياه الجوفية الصالحة للشرب وتآكل السواحل نتيجة ارتفاع مستوى سطح البحر على الصعيد العالمي والتي تضاف إلى ظاهرة الغمر المحلية. وتعد منطقة دلتا النيل ، التي تعرف منذ أكثر من ثلاث عقود من الزمن بسرعة تأثرها والتي لاتزال سرعة تأثرها تزداد اليوم، معرضة للخطر على نحو خاص وخاصة بعد بناء السد العالي حيث قام بحجب الطمي الذي كان يلعب دوراً في رفع منسوب قاع النيل نتيجة ترسيب الطمي في مصب رشيد ومصب دمياط.

لذلك تهدف هذه الدراسة الى :-

١- تقييم مخاطر ارتفاع مستوى سطح البحر على الانشطة الاقتصادية والخدمات بمنطقة ابوقير.

٢- بناء نموذج الارتفاع الرقمي لمنطقة ابو قير

٣- تحديد اكثر المناطق المعرضة لخطر ارتفاع مستوى سطح البحر بمنطقة ابو قير

٤- اقتراح تقنيات حديثة لمواجهة ارتفاع مستوى سطح البحر

وبالنسبة لمنطقة ابو قير التي تعتبر جزء من مدينة الاسكندرية والدلتا وكانت هناك دراسات سابقة عن غرق الدلتا وما زالت هذه الدراسات مستمرة ونجد ان منطقة ابو قير منطقة ذات طبيعة ارضية منخفضة وذات مناسيب منخفضة مما يعرضها الى خطر ارتفاع مستوى سطح البحر. نجد أن منطقة ابو قير منطقة مركزية حيث انها تتمتع بموارد طبيعية جيدة حيث يوجد فيها عدد من المصانع على طول خط الساحل ومساحات من الاراضي الزراعية ومناطق سياحية ويوجد بها عدد من القلاع التي لم يستفاد منها سياحياً حتى الآن بالإضافة انها منطقة خدمات

حيث يوجد بها عدد من المدارس والمستشفيات والوحدات الصحية . مما يجعل لها أهمية في منطقة الدلتا . لكن في الاونة الاخيرة نجد ان منطقة ابوقير تتعرض لخطورة ارتفاع مستوى سطح البحر وخاصة بعد العاصفة التي ضربت الاسكندرية في ١٠ / ١٢ / ٢٠١٠ والتي زادت من خطورة تعرض منطقة ابو قير الى الغرق حيث ان منطقة خليج ابو قير من المناطق الساحلية المهملة والتي لا يوجد اى نوع من انواع الحماية الشاطئية لها مما يعرضها الى الخطر في حالة حدوث اى نوع من العواصف المفاجئة . بالتالى تتعرض كل الانشطة الاقتصادية الى الخسارة وخصوصا حرف الصيد وايضا السكان سيتعرضون الى الهجرة الداخلية من منطقة ابو قير الى المناطق الداخلية الاكثر أمناً.

في هذه الدراسة تم التركيز علي التأثيرات التي سوف تتعرض لها منطقة ابو قير بإستخدام تقنية نظم المعلومات الجغرافية (GIS) Geographic Information System وخرائط حديثة Update Map وبرنامج الجوجل إيرث Google Earth وصور للاقمار الصناعية SRTM.

و قد تم استخدام جميع البيانات السابقة وجمع عدد من خرائط البيانات الحديثة من الاماكن المتخصصة سواء كانت بيانات خاصة بالسكان او الانشطة الاقتصادية فى المنطقة وقمنا بعمل عدد من الزيارات الميدانية للوقوف على طبيعة الوضع الان ووضعنا فى الاعتبار لإجراء تقييملاآثارالتيفد تتعرض لها منطقة ابو قير جراء ارتفاع سطح البحر سواء كان ذلك ناتجا من التغيرات المناخية أو نتيجة هبوط الأرض في منطقة دلتا النيل المتاخمة لمنطقة الدراسة.

ركزت الدراسة علي تقييم المخاطر المعرضة لها منطقة ابو قير جراء ارتفاع مستوى سطح البحر من خلال اعداد خريطة مقسمة الى مناطق خطرة ومناطق متوسطة الخطورة ومناطق قليلة الخطورة بناء على نموذج الارتفاعات المنتج من المناسيب لهذه المنطقة ومن بعد ذلك نقيم ال-مخاطر عن طريق استخدام عملية التتابع Overlaying بين نموذج الارتفاعات وبين الطبقات التي تم انشاءها بأستخدام تقنية نظم المعلومات الجغرافية .

و من النتائج ان هناك تأثير كبير على الانشطة الاقتصادية فى هذه المنطقة حيث وجد ان هناك نسبة ٤٩% من الاراضى الزراعية تقع فى المنطقة الاكثر خطورة وهى المنطقة المنخفضة التى تتراوح فيها المناسيب ما بين -4م الى -1م تحت مستوى سطح البحر، وهناك نسبة ٢٦% من الاراضى الزراعية تقع فى المنطقة متوسطة الخطورة والتي تتراوح فيها المناسيب من ٠ م الى ٣ م فوق مستوى سطح البحر، وهناك نسبة ٢٥% من الاراضى الزراعية تقع فى المنطقة الاقل خطورة التى تتراوح فيها المناسيب من ٣م فأكثر فوق مستوى سطح البحر.

اما بالنسبة للبعد الثانى من الانشطة الاقتصادية وهى الصناعة فنجد ان هناك نسبة ٣٤ % من الصناعة تقع فى المنطقة الاكثر خطورة، ونسبة ٦٦ % تقع فى المنطقة متوسطة الخطورة.

وبالنسبة للمباني هناك نسبة ٥ % تقع فى المنطقة الاكثر خطورة، ونسبة ٤٠ % تقع فى المناطق متوسطة الخطورة، ونسبة ٥٥ % تقع فى المناطق الاقل خطورة.

وبالنسبة للخدمات فى منطقة ابو قير حيث يوجد عدد كبير من الخدمات يتمثل فى (المدارس- المستشفيات – الوحدات الصحية)

بالنسبة للمدارس يوجد ١٠ % من المدارس تقع فى منطقة الخطر، ونسبة ٧٤٠ % تقع فى المنطقة متوسطة الخطورة ونسبة ٢٠ % تقع فى المنطقة الاقل خطورة.

بالنسبة للمستشفيات هناك نسبة ٨٤ % تقع فى المنطقة متوسطة الخطورة ونسبة ١٦ % فى المنطقة الاقل خطورة.

بالنسبة للوحدات الصحية هناك نسبة ٧٥ % تقع فى المناطق متوسطة الخطورة ونسبة ٢٥ % تقع فى المناطق الاقل خطورة.

ملحوظة : مع الارتفاع المتزايد لمستوى سطح البحر نجد ان التصنيف للمناطق الاكثر والمتوسطة والاقل خطورة سيختلف فتصبح المناطق المتوسطة الخطورة هى المناطق الاكثر خطورة وبالتالي ستختلف هذه النسب من عام الى آخر او ستختلف من يوم الى اخر نظرا لطبيعة الجو المتغيرة ما بين الحين والآخر.

وكان من افضل الطرق فى التأقلم مع التغيرات المناخية هى أنظمة الانذار المبكر للعواصف الشديدة نظراً لان قوى الطبيعة لا تستطيع الحواجز ان تمنعها.

هذه الدراسة تعتبر بمثابة ناقوس انذار لما قد تتعرض له منطقة ابو قير من مخاطر سواء كانت فقدان الاراضي أو مشاكل اجتماعية و اقتصادية بالاضافة الي فقدان قيم أثرية لا تقدر بثمن لذلك كان من اهم وأبرز التوصيات:-

١- لابد من التخطيط المستقبلى للتكيف مع ارتفاع مستوى سطح البحر عن طريق حماية وتغذية الشواطئ لحماية الأنشطة الاقتصادية مثل الأنشطة الزراعية والصناعية والسياحية.

٢- لابد من المشاركة المجتمعية وزيادة الوعي لدى المواطنين بمشكلة التغيرات المناخية لذلك لابد من تفعيل دور الجمعيات الأهلية .