Workshop on "Building Climate Resilience in the Nile Delta; Urban Water Management for Effective Solutions."

16TH – 17TH OF JUNE 2013, CAIRO, EGYPT

Egyptian Water Partnership

TENTATIVE AGENDA

WORKSHOP ON

BUILDING CLIMATE RESILIENCE IN THE NILE DELTA URBAN WATER MANAGEMENT FOR EFFECTIVE SOLUTIONS

16TH – 17TH OF JUNE 2013, CAIRO, EGYPT

Day 1, 16th of June 2013

9:30 - 10:00	**REGISTRATION**
10:00 - 10:45	**OPENING SESSION:** ***Welcome Speeches and Introduction***
	H. E. Dr. Mahmoud AbuZeid, Egyptian Water Partnership (EWP), President
	H. E. Dr. Mohamed Bahaa ElDin, Minister of Water Resources and Irrigation.
	H. E. Dr. Abd Elkawy Khalifa, Minister of Potable Water & Sanitary Drainage.
10:45 - 11:00	**COFFEE BREAK**
First Theme	***Issues and Challenges***
11:00 - 11:20	Challenges facing the Nile Delta, Eng. Mohamed ElRawady, (EWP)
11:20 - 11:40	Sea Water Intrusion in Coastal Groundwater Aquifer of the Nile Delta, Dr. Madiha M. Darwish, (NWRC)
11:40 - 12:00	Natural and Man-Made Systems for Coastal Protection in the Nile Delta, Dr. Ibrahim ElShenawy.
12:00 - 12:20	Solid Waste Disposal in Waterways, Dr. Ashraf Hebash, (MWRI)
12:20 - 12:40	Gamasa Hurricanes, Mr. Wahid Soaudi (Egypt Metrological Authority)
12:40 - 1:40	Open Discussions
1:40 - 3:20	**LUNCH**
	Five Working Groups
3:20 - 4:20	Working groups discussions on the First Theme: Introduction, Issues and Challenges
4:20 - 4:35	**COFFEE BREAK**
4:35 - 5:00	Presentation of The Working Groups.

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مبنى سيدارى، ٢ شارع الحجاز،روكسى، مصر الجديدة، القاهرة، مصر
ت: ٦٦٣# ٤/٣/٢/ ٣٩٢١ –٢٤٥١ (٢٠٢) فاكس : ٣٩١٨ – ٢٤٥١ (٢٠٢)
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Day 2, 17th of June 2013

Second Theme	***National & Local Plans affecting Deltas in Africa***
9:30 - 9:50	Egyptian Delta Alliance Wing, Dr. Ibrahim ElShenawy (NWRC).
9:50 - 10:10	2017 National Water Resources Plan; Facing the Challenges, Dr. Mamdouh Ahmed Antar (MWRI)
10:10 - 10:30	Nigeria Delta Case Study, Eng. Clement Onyeaso Nze, (Nigeria Water Partnership)
10:30 - 10:50	2030 Strategic Vision for Wastewater Reuse in Nile Delta Governorates, Dr. Khaled AbuZeid (CEDARE/EWP)
11:10 - 11:30	The National Climate Change Adaptation Strategy, Dr. Mohamed Ismail (EEAA)
11:50 - 12:10	2030 Alexandria Integrated Urban Water Management Plan, Dr. Khaled AbuZeid (CEDARE/EWP)
12:10 - 12:30	**COFFEE BREAK**
	Five Working groups
12:30 - 2:10	Working groups discussions on the Second Theme: National & Local Plans Affecting Deltas in Africa
2:10 - 3:30	**LUNCH**
	Five Working groups
3:30 - 4:30	Working groups discussions on the Second Theme: National & Local Plans Affecting Deltas in Africa
4:30 - 4:45	**COFFEE BREAK**
4:45 - 5:00	Presentation of The Working Groups

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1. OPENING SESSION:

The Workshop on Building Climate Resilience in The Nile Delta; Urban Water Management for Effective solutions was launched by The Egyptian Water Partnership (EWP), which was organized in the framework of partnership and cooperation between EWP, Global Water Partnership (GWP) and the Netherlands International Development Program (DGIS) to develop a global program of action for sustainable development of delta ecosystems worldwide. The workshop was held at the Intercontinental City Stars Hotel during the period from 16th to 17th of June, 2013.

The opening ceremony was inaugurated by H. E. Dr. Mahmoud AbuZeid, President, Egyptian Water Partnership (EWP), H. E. Dr. Mohamed Bahaa ElDin, Minister of Water Resources and Irrigation and H. E. Dr. Abd Elkawy Khalifa, Minister of Potable Water & Sanitary Drainage and Dr. Khaled AbuZeid, General Secretary, Egyptian Water Partnership.

DR. KHALED ABUZEID, GENERAL SECRETARY, EGYPTIAN WATER PARTNERSHIP, greeted the ministries and welcomed all participants to the workshop and he highlighted the main points that would be presented during the two days workshop. Some of which were Challenges facing the Nile Delta, Sea Water Intrusion in Coastal Groundwater Aquifer of the Nile Delta, Natural and Man-Made Systems for Coastal Protection in the Nile Delta, the wheat crop production per meter cubic of water on the international level, the solid waste disposal in waterways in the Delta, Hurricanes and storms that faced some of Delta Governorates, National and Local Planning; 2017 National Water Resources Plan; Facing the Challenges, 2030 Strategic Vision for Wastewater Reuse in Nile Delta Governorates, 2030 Alexandria Integrated Urban Water Management Plan, The National Climate Change Adaptation Strategy, and the Nigeria Delta Case Study which would be represented by the Nigerian Water Partnership as a kind of experience exchange under the umbrella of the Global Water Partnership and Delta Alliance.

Dr. AbuZeid explain that during the two days workshop there will be working groups on the followings; Delta Challenges, and Facing Challenges so that to conclude the recommendations in the Building Climate Resilience in The Nile Delta; Urban Water Management Programme which will be represented to Deltas Alliance Wing and Global water Partnership.

Finally, he concluded his brief greeting words by expressing his gratitude and he wished the participants fruitful discussions and sustainable results.

Then, he introduced the other speeches beginning by H. E. Dr. Mahmoud AbuZeid, Egyptian Water Partnership (EWP), President, H. E. Dr. Mohamed Bahaa ElDin, Minister of Water

Resources and Irrigation and H. E. Dr. Abd Elkawy Khalifa, Minister of Potable Water & Sanitary Drainage.

H. E. Dr. Mahmoud AbuZeid, Egyptian Water Partnership (EWP), President, welcomed all the participants and then he addressed some characteristics of deltas in regions and mentioned some of the challenges facing the Nile Delta in Egypt, This besides the impact on human settlements and welfare of societies. Some of the action plans of the environmental conventions (such as the Ramsar Convention on Wetlands, the UN Convention on Biodiversity and the UN Convention to Combat Desertification) do contain elements that could also be part of an adaptation strategy for Egypt. For instance, measures to alleviate desertification or conserve coastal ecosystems are likely to make the country more resilient to climate change.

Then, Dr. Abuzeid talked about the adaptation to Coastal Zone Risks and the adaptation to Socio-Economic Impacts. Stating that it is important to note that many, if not all, of the adaptations for water resources and other sectors can be justified without consideration of climate change. Egypt's extremely limited water supplies, combined with the continuously growing demand, make more efficient use of water and enhancement of supplies imperative.
At the end, he concluded, that water management strategies to increase climate resilience and ensure water and food security and livelihoods in coastal delta areas requires a mix of policy reforms and scaling up of investments. Progress should be made towards integrating "climate-smart agriculture" into broader development and growth programs. Improving agricultural water management and watershed management, and addressing sea-surges, salinity and coastal flooding is a must. The particular challenges of livestock, fisheries, and deforestation should be given utmost attention.

And he also mentioned that in this concern, the Arab Water Council, acting as a Regional Coordinator with activities extended on both regional and international scale, works hard towards mobilizing societies to face all this package of challenges in an efficient and effective way, with the ultimate aim of achieving sustainable development.

Finally, Dr. Mahmoud wished the participant all the best of luck in the workshop deliberations.

H. E. Dr. Mohamed Bahaa ElDin, Minister of Water Resources and Irrigation, greeted the ministers and welcomed the entire participants. He expressed his deep pleasure to attaend this workshop.

H. E. stated the current water status in Egypt and the challenges facing Egypt due to increase in population and in return cause increase in the demand for drinking water. As the share per capita of water resources in Egypt has decreased from 1460 m3 year 1977 to 640 m3 year 2012.

Dr. Bahaa also pointed to the current pollution of all the water resources passages due direct or indirect drainage of wastewater (sewage, industrial, and agricultural), which affects the public health and the environment.

Also, the climate change is one of the major challenges that faces the water sector in Egypt, which affects the annual income of the Nile water that reaches the Lake of Naser and the water agricultural demand due to expected increase in temperature degrees.

He mentioned that the MWRI is developing and managing the water resources to provide all the water needs through a number of water dynamic policies to maximize the usage of the water resources.

He also mentioned that the National Water Resources Plan (NWRP) is an updating of the water policies and plans which main principle is Integrated Management of Water Resources.

H. E. explained that the NWRP main objective is to development of new water resources and to increase the usage efficiency of the available water resources.

Then, he talked about the necessity of reuse of wastewater (agricultural and treated sewage), that to decrease the difference between the non renewable water resources and the water needs in the different sectors.

One of the main concerns that the ministry had adopted is the reuse of agricultural drainage through mixing the agricultural drainage with the water in canals which is called mixing mediator which permits the reuse of wastewater without affecting the effecincy of drinling water stations.

He also briefed that the current usage of treated wastewater is to cultivate wooden forests, Jatropha ,and Jojoba wooden trees and he stated the importance to expand the usage of treated wastewater in different crops under the necessary supervision.

Last but not lease, he concluded that Egypt moves from the concept of water abundance to water scarcity, that's why all the concerned sectors have to work on increasing the efficiency of water usage, rationalization of water resources, and reuse of treated wastewater without affecting the environment.

At the end, H. E. Dr. Bahaa acknowledged all the participants and whished them fruitful discussions.

H. E. Dr. Abd Elkawy Khalifa, Minister of Potable Water & Sanitary Drainage, greeted the ministers and expressed his pleasure to attend the opening of this valuable workshop. H. E. Mentioned some main points concerning the wastewater drainage and water supply. Some of which are redistribution of the governmental fund support to ensure that it reaches the poor people, he also said that the sanitation drainage network in Egypt needs 80 billion to extend the facilities and services to all those who has no access to clean drinking water and adequate sanitation services, those are about 42 Million i.e. 50 % of the current population.

He talked about the allocation breakdown of the budget (8 billion EGP) which is one third for the networks, one third for lifting the wastewater, and one third for wastewater treatment.

He also mentioned that there is a need to construct 300 Station and there is a necessity need for the involvement of the private sector and the civil society.

H.E. mentioned that the civil Society has a great share in establishing some of the networks directly and that the holding company give the technical support only.

And he also stated that there is a potential of investment in Upper Egypt through planting the land surrounding the treated wastewater plants and of course usage of the treated wastewater. At the end he stressed on the main problem nowadays in Egypt which is the adequate sanitation services.

He ended his speech by wishing the participants a fruitful and successful workshop.

2. FIRST DAY:

ENG. MOHAMED ELRAWADY, BOARD MEMBER, EWP presented Challenges facing the Nile Delta by showing the 4 main delta-issues in delta which are:

- Competing and escalating demands: Different sectors are competing over water, with the growing population and the evolving industry, the agricultural sector is facing a growing competition. The sector of the highest national consumption, in itself also has competing demands of its own, especially between upstream and downstream farmers.
- What are the 4 main delta-issues in your delta? (Cont'd)
- Water Quality Degredation and Pollution: caused by Inadequate treatment of municipal and industrial waste water.
- Ground Water Depletion and Sea Water Intrusion: caused by excess pumpage of groundwater and excessive granting of well permissions.
- Coastal Shore Erosion and Sea level rise.

Then, he addressed measures to deal with these issues including; EWP was part of a nation wide dialogue on treated wastewater reuse as a measure for decreasing competition over conventional water resources, facilitated the establishment of water treatment plants and low cost sanitation schemes in rural areas of the Nile Delta, organized a seminar on the future of water in Egypt, and coordinated a focus study and organized workshops on industrial areas' water impacts in the delta.

Then, he added that EWP was also a part of a future planning process for the coastal city of Alexandria that depends entirely on the Nile, developing what has been known as the Alexandria 2030 Integrated Urban Water Management (IUWM) plan. One of the main objectives of that plan is reducing the pressure on the Nile Delta by developing non-conventional water resources where possible.

Eng. ElRawady mentioned organizing the process was through; constantly in contact with decision makers and different stakeholders, continuously facilitating technical Dialogue through workshops, disseminating knowledge through publications, organizing awarness campaigns and public events, developing project concept notes and proposals and giving awareness presentations.

He also explained some of the difficulties like lack of harmonization between different sectors, which is emphasized the most by mismatching Water, Agricultural, and Urban development policies.

At the end, he suggested the following; watch for trends of urban encroachment on Deltas, monitor pollution sources and water quality and identify all competing uses and get stakeholders consensus on ranking them by priority.

DR. MADIHA M. DARWISH, MINISTRY OF WATER RESOURCES AND IRRIGATION –EGYPT presented in detail the Annual Water Resources in Egypt, Role of Groundwater to the Country, Groundwater management issue and constraints, Challenges related to WRM, Development area in Egypt, SWI in the Nile delta aquifer, Solutions to stop increments of SWI.

She stated the Groundwater Management-Issues and Constraints by explaing that the estimation of groundwater potential is an important step that should be carried out carefully prior to planning groundwater development. However, potential may be affected (positively or negatively) by the applied management technology and constraints/issues facing groundwater use and allocation. An effort is made in this section to classify development technologies and major issues facing groundwater development and management. Moreover, potential functions of aquifer systems are discussed as a mean to support allocation decisions.

Dr. Madiha mentioned the challenges; First Set: Population Growth by showing the followings; Population growth against constant quota from the Nile, Population growth against a constant inhabited physical area, Uneven distribution of water resources over the country physical area and Population growth against a decrease in arable land. Second Set:Inappropriate management of Groundwater and Related Water Resources by showing the followings; Poor control on wells drilling, Poor control on flowing wells, Sustainability of non-renewable groundwater, Allocation of groundwater to uses does not make use of the comparative advantage, Inappropriate rain water harvesting techniques, and Inappropriate protection works from flood risks.

Third Set:Climate Change by showing the followings; Less rainfall on the Nile basin resulting in less water reaching Aswan, Sea water rise and resulting sea water encroachment to the coastal aquifers, Cycles of drought and high rainfall on the coastal areas, Cycles of flash floods and drought in wadis

Fourth Set: Pollution by showing the followings; Poor awareness with respect to groundwater pollution (confusion between pollution of water wells and the whole storage in various aquifers, Water supply is not accompanied by sanitary drainage and treatment, Uncontrolled reuse of agricultural drainage, Uncontrolled damping of solid wastes, and Poor protection of well heads and well proper (drinking water wells).

Fifth Set: Poor Knowledge on Other possible sources of water by showing the followings; Some sources of water are not receiving attention (Non-fresh groundwater), irrespective its wide distribution and economic use. And last she added the Sixth Set; Poor Decentralization, and poor participation in water management is very poor.

DR. IBRAHIM ELSHENAWY DIRECTOR OF COASTAL RESEARCH INSTITUTE (CORI), EGYPT presented the Natural and Man-Made Systems for Coastal Protection in the Nile Delta by showing some facts and explaing the followings; IPCC Considers the Nile Delta as one of the vulnerable areas of the world (Populated Deltas), Rain Gauge Network 1950-2000, expected SLR Till 2100 by Projected Increase in Air Temperature (A1F1 Scenario), Coastal Sand Dunes and others.

Then, Dr. Ibrahim breifed the Adaptation to the Impacts of Sea Level Rise in the Nile Delta Coastal Zone, Egypt, 2009-2012 which was funded by International Development Research Centre (IDRC) by stating its main objective which is to addresse vulnerability assessment and adaptation options for potential impact of SLR in coastal zone and case study application in Ras ElBar - Gammasa Region

Next, Dr. Shenawy explained the Adaptation Process and Policies by mentioning the following points;

- Sand dunes systems should be treated as the first defensive line for the Nile Delta.
- Decision makers in coastal governorates as well as concerned ministers should be aware of the importance of sand dunes systems and their role in protecting the coastal zone of the Nile Delta.
- Consideration should be paid to coastal lakes as one of the most appropriate adaptive measure against sea level rise.
- Coastal international road should be considered as the second protection measure and studies to support it are urgently required.
- Coastal protection constructions need regular maintenance and should be considered in any coastal zone management plans.
- The northwest coast extended from Alexandria to the Egyptian-Libyan borders is not vulnerable as it has elevation more than 10 m above average sea water level.

At the end, he mentioned in detail the recommendations including the followings;

- Capacity building in terms of staff, technologies, modeling, ….etc.
- Preparation of integrated coastal zone management scheme

- Research budget and funds should be increased to cope with the national and international crisis regarding climate change and its impacts and adaptation studies.
- Building co-operative mechanism to integrate all efforts
- Awareness program and media campaign
- Regional monitoring and observation system
- Regional data base and knowledge exchange system
- Regular Maintenance program for protection structures
- The following aspects are recommended to be covered in further studies for the coastal zones:
- Potential impacts on land and groundwater salinity
- Potential impacts on patterns of waves and currents
- Potential impacts on erosion and accretion systems due to currents, waves, and wind actions
- Potential impacts on lakes ecosystems
- Potential impacts on water resources and drainage systems
- Potential impacts on fisheries due to changes expected in current patterns
- Potential impacts on infrastructures and natural resources of the coastal zone of the Nile Delta
- Potential impacts of climate changes on evaporation from oceans and seas open waters and their role in reducing SLR
- Potential impacts of temperature increase on phyto-plankton role in absorbing CO2 and generating O2.

DR. ASHRAF HEBASH, MINISTRY OF WATER RESOURCES AND IRRIGATION (MWRI) – EGYPT. He started by mentioning that the Ministry of water resources and irrigation spares no effort in the development and modernization of laws containing the different water uses and to prevent pollution and preserve waterways and drainage and irrigation facilities and maintenance, as well as facing problems in the management of water resources in Egypt, notably the limited water resources are currently available with surge in population, in addition to the deteriorating environmental conditions relevant to water as a result of pollution. Despite the seriousness of the problems facing Egypt in the field of water, there are ample of opportunities which gives hope to improve water management and to overcome the difficulties involved with all the different devices and also through the application of Act No. 48 of 1993 on the protection of the River Nile from the Nile River and waterways from pollution, law No. 12 of 1984 on irrigation and drainage, and law 4/1994 for the environment

Main axes of the water policy suggested by Egypt until 2020 by explain the role of the ministry in the maintenance of the waterways and canals, he mentioned in details the mechanical, manual, and biological maintenance.

Then, Dr. Ashraf explained the main sources of water pollution which is represented in industrial drainage, sewage drainage, agricultural drainage and solid disposal.

MR. WAHID SOAUDI, GENERAL MANAGER, ANALYSES, FORECASTS AND OFFICIAL SPOKESMAN OF THE EGYPTIAN METEOROLOGICAL AUTHORITY, First, he simplified the definition of cyclones which are storms (aerobic movements) helical, usually arise over the sea or the tropical oceans and is heading towards land causing destruction to everything that stands in their way and continue for several days and is often the most destruction to the beaches.

Then, formation of a hurricane as when it heats water in a tropical sea to temperatures ranging from 27 to 28 degrees centigrade works to heat the adjacent air layer, and the heated air pressure reduced, expands and rises to the top and the low pressure region are attracted by the winds of the high pressure surrounding it blowing from every direction which leads to evaporation of water, the steam rises to the top of the Central light cold air.

He also mentioned statistics for some hurricanes and showed maps of surface and upper- before and during the Gamasa hurricane affected counties and cities in the North of the country, including the area of Gamasa in dakahlia governorate with a surface low pressure coupled with winds NNE at high temperature and with a high percentage of water vapor due to the presence of another low pressure in the upper atmosphere jet stream, accompanied by very cold resulting in severe instability in weather.

Formed Cumulus clouds thunderstorm accompanied by heavy rains, hail and the clouds accompanied by upward air currents and other downside resulting winds Very high speed over 50 knots, about 90 km/hour, the wind is violent and destructive to buildings, ceilings and columns, this is what actually happened on the area of Gamasa.

KIA issued a meteorological warning to all State sectors, including the media, on the morning of 09-5 Wald-2013 confirmation of atmospheric releases and past this warning, at least for 72 hours and had been warned of bad weather to coastal cities and some provinces face maritime and Northern Sinai.

At the End, Mr. Waheed mentioned some important recommendations which are:

- To announce weather bulletin at least three times a day.
- To announce the weather forecasts by Messrs. air specialists due to their ability to deliver information.
- The establishment of hot lines for direct communication between the Egyptian Meteorological Authority, the Middle East News Agency to disseminate weather warnings as soon as possible through the print and broadcast media.

- Establishment of a crises committee composed of members of the the meteorological-news section of the radio and television, Union-Ministry of Interior-Ministry of defense, Ministry of irrigation, and any other concerned facilities
- Rebuild the watershed in the appropriate places in the areas concerned by the heavy rainfall and sometimes where rainfall for torrents

3. SECOND DAY:

DR. IBRAHIM ELSHINNAWY, DIRECTOR OF COASTAL RESEARCH INSTITUTE (CORI), NATIONAL WATER RESEARCH CENTER (NWRC), MINISTRY OF WATER RESOURCES & IRRIGATION (MWRI), started by explaining Delta Alliance which is an international knowledge-driven network organization with the mission of improving the resilience of the world's deltas. Delta Alliance brings people together who live and work in deltas. They can benefit from each other's experience and expertise in order to contribute to an increased resilience of their delta region.

He also briefed that the in June 2011, the international network organization of Delta Alliance has become a legal entity by establishing the Foundation "Delta Alliance International". Delta Alliance International is managed by an International Governing Board and an Advisory Committee which main task is to advice the Governing Board on strategic and operational issues. The International Secretariat is based in the Netherlands and is amongst others responsible for supporting the International Governing Board and the Advisory Committee. A Wing is a network of organizations in a specific country or area, which is dealing with delta-related issues.

A Wing must be recognized and admitted to the Foundation by the International Governing Board. Currently, Delta Alliance International includes 10 wings.

Dr. Ibrahim highlighted the mission which is to improve the resilience of deltas worldwide, through the strategy of which; envisioning and defining resilience for deltas, measuring and monitoring resilience, reporting and creating pressure to improve resilience, providing inspiration to improve resilience and providing assistance to improve resilience.

DR. MAMDOUH AHMED ANTAR, MINISTRY OF WATER RESOURCES AND IRRIGATION, (MWRI) PRESENTED THE 2017 NATIONAL WATER RESOURCES PLAN; FACING THE CHALLENGES, OBJECTIVES, COMPONENTS, AND TOOLS. He started by explaining the IWRM Concept in NWRP; Water Supply and Demand Management, Water Quantity and Quality Management, National Water Resources Plan (NWRP), Economic, Environmental and Financing Aspects of Water Programmes, Institutional Reforms and new active roles of water actors at all levels, Legal Amendments and Enforcement of water laws and regulations, Involvement of all stakeholders at all stages (Participatory Approach), and NWRP is a National Collaborative Plan, NOT MWRI Plan.
He briefed the NWRP phase I Main Objective which is Development of the National Water Resources Plan (NWRP), that describes how Egypt will safeguard its water resources in the future (till 2017), both with respect to Quantity and Quality, and how it will use these resources in the best way considering the socio-economic and environmental aspects.

While (NWRP – CP) Phase II; The overall objective of the NWRP-CP is to assist the various functional actors and implementing agencies involved in the implementation of NWRP 2017 at central and de-central level in order to facilitate the efficient and timely implementation of the NWRP.

Dr. Mamdouh briefed the NWRP Main Accomplishments which can be itemized as follows:

- Operational Coordination Platform
- Collective Planning Framework
- Capacity Development and Training
- Governorate Water Resources Plans (GWRPs) for the three pilot governorates
- Water Status for Egypt: Annual Report
- Web Site
- Functional Monitoring and Evaluation System (M & E)
- Comprehensive Decision Support System (DSS)

NIGERIA DELTA CASE STUDY, ENG. CLEMENT ONYEASO NZE, (DIRECTOR, ENGINEERING HYDROLOGY), NIGERIA HYDROLOGICAL SERVICES AGENCY& NATIONAL PROJECT COORDINATOR NIGER-HYCOS/NIGER BASIN AUTHORITY (NIGERIA WATER PARTNERSHIP), started by presenting A BRIEF on THE RIVER NIGER: River Niger is the third longest river in Africa that takes its source from the Fouta Djallon highland in Guinea at an approximate altitude of 800m, before traversing over a distance of about 4,200km to empty into the Atlantic Ocean in Nigeria. The initial catchment area of the Niger basin was about 2,000,000km2 covering 10 countries including Algeria, but as a result of desert encroachment, the catchment was reduced to an active catchment area of about 1,500,000km2 with the exclusion of Algeria.

The remaining 9 countries covered by the basin's active catchment areas are namely; Benin, Burkina Faso, Cameroun, Cote D'Ivoire, Guinea, Mali, Niger, Nigeria and Tchad.
These Countries formed the Niger Basin Authority (NBA) initially as River Niger Commission (RNC) in 1964 with the view to fostering cooperation among its member countries in the use and management of the basin's resources among others. The RNC was changed to the NBA in 1980 with additional mandates for the enhancement of effective integrated water resources management and development of the basin in all fields notably: energy, water resources, agriculture, animal rearing, fish breeding, transportation, communications and industry.

Then, Eng. Nze briefed that the Delta area of Nigeria commonly referred to as the Niger Delta region lies at the south southern end where the main rivers of Nigeria (Niger and Benue) empty their waters into the Atlantic Ocean and is made up of nine (9) states

Over 80% of the wealth of Nigeria comes from the crude oil deposits in the Niger Delta region. Yet, it has suffered untold devastation since oil exploration and exploitation began in the area in the late 1950's. Oil prospecting, exploration and exploitation in the Niger Delta

region have led to; Pollution and degradation of farmlands and fishing ponds; Destruction of the ecosystem (flora and fauna); Uncontrolled gas flaring which has destroyed plants and animals; Outbreak of all kinds of diseases; Dislocation of the socio-cultural life of the people; Migration to other locations by man, animals and fishes; Constant communal clashes; Youth restiveness with attendant militancy, kidnapping of oil workers; Destruction/vandalization of oil pipelines; Frequent fire outbreaks; Decline in the amount of crude oil production and export by Nigeria; Government military intervention with attendant destruction of life and property, etc.

He explained the areas of target for enabling environment that include:

- Policies (including national water resources policy, climate change adaptation policies and those relating to water resources):
- Legal Framework (including elements of water law, implementation and enforcement and integrating legal framework for IWRM), and
- Investment and Financial Structure (including investment framework, strategic financial planning, generating basic revenue for water and repayable sources of finance for water).

Eng. Clement also mentioned the lessons learned which are listed as follow:

- Legal frameworks (international and national) are an important and integral part of effective integrated water resources management (IWRM)
- Legal framework should ideally, deal with the entire watercourse nationally (i.e. where domestic legislation applies) or may need to be devised at a range of scales, such as international or regional where the watercourse is transboundary or internally shared.
- Legal framework should be transparent, flexible and capable of evolving to meet changing circumstances. Water laws should recognize water as a finite and vulnerable resource, an economic good and a natural resource having cultural, social and environmental values.

Al the end, he highlighted that the Nigeria's Delta region has continued to suffer environmental degradation owing to oil exploration and exploitation in the past 50 years. The people's sources of livelihood (fishing, farming, etc) have been destroyed by oil pollution, resulting in untold hardship on the populace. This cumulative neglect over the years resulted to restiveness and agitation in the region which gave birth to all kinds of criminal activities like kidnapping of oil workers and asking for ransom, destruction of oil pipelines, bombing of government premises, etc.
There are however, concerted efforts through government policies in recent years to systematically address the problems of this region which produces the wealth of the nation.

DR. KHALED ABUZEID, REGIONAL WATER RESOURCES PROGRAMME MANAGER, CEDARE AND GENERAL SECRETARY, EGYPTIAN WATER PARTNERSHIP, He presented the 2030 Strategic Vision for

Wastewater Reuse in Nile Delta Governorates. First he started by presenting many graphs showing the current situation of water resources in some of the Nile Governorates such as; Population Distribution Scenarios 2050 , Water Demand First Scenario 2050, Water Demand Second Scenario 2050, 2030 Projected Water Supply Capacity (BCM) and he mentioned that the Municipal Water Status is as follow; Current annual municipal water production from the Nile: 6.62 BCM/year, Current annual municipal water production from groundwater: 1.38 BCM/year, and Current annual municipal water production from desalination: 61 MCM/year.

Second, he presented the Wastewater Status as follow; The annual produced wastewater amounts to 6.5 BCM, which is about 81 % of the total produced domestic water, About 5.5 BCM of wastewater is collected, About 44%of the nationally produced wastewater is not treated, which is equivalent to 2.85 BCM, and 3.65 BCM of wastewater are treated annually, 0.73 BCM of which (20%) are treated primary treatment, 2.92 BCM (80%) are treated secondary treatment, and The wastewater collection network has a total length of 39,000 KM.

Third, he explained the Wastewater Reuse in Agriculture as shown below:

- According to HCWW, 300 MCM of the treated wastewater is used annually for irrigation all over Egypt
- The total amount of officially reused agricultural drainage is 6.3 BCM (NWRC, 2008). About 13.5 BCM of mixed agriculture drainage and wastewater is finally produced. The latter amount consists of about 7 BCM of agricultural drainage of very poor quality due to multiple re-use, as well as 6.5 BCM of municipal and industrial wastewater.

And he also mentioned the Main Rules that Govern the Wastewater Re-use Process which are; Law 93/1962 & Decree 44/2000 for discharging on public drains, Law 48/1982 and its executive regulations regarding the protection of the Nile and waterways from pollution, Egyptian Code No. 501/2005 for wastewater Reuse, and Decree No. 603/2002 for minister of agriculture , which prohibits the use of treated and untreated wastewater in irrigating conventional plants , but allows its use in wood trees , ornamental trees , and fuel-production trees (ex jatrova , jujoba, …). (However, it can be argued that the decree somehow contradicts with the reuse code).

Forth, Dr. AbuZeid briefed the Obstacles and institutional constraints towards achieving strategies as stated below:

- Obstacles and Institutional Constraints
- The financial resources required to increase the national coverage of wastewater collection, and to upgrade the level of treatment.
- The proximity of potential arable land to wastewater treatment facilities and the different physical conditions surrounding each treatment plant.
- The environmental and health concerns and perception associated with using treated wastewater for agriculture.

- The Egyptian wastewater re-use code that prohibits using secondary and tertiary treated wastewater for edible crops.
- The Irrigation & Drainage Egyptian law that prohibits conveyance of any level of treated wastewater through irrigation canals.
- Obstacles and Institutional Constraints (2)
- The Environmental & health regulations & laws.
- The generation of new water demands by the wastewater companies due to directing the collected wastewater to Wood and Bio-fuel tree plantations.
- The anticipated competition over treated wastewater by the irrigation sector that needs to satisfy national water demands, and the agriculture sector that needs to satisfy agriculture expansion plans, and the water and wastewater sector that needs to generate income from treated wastewater produced to cover its operation and maintenance costs.
- The risk of not being able to market the agriculture products for export to neighboring markets such as the EU and the Gulf states due to the use of treated wastewater.
- The Health & Environmental hazards associated with improper handling of the different levels of treated wastewater by users.

Then Dr. Khaled stated the Proposed 2030 Strategic Directions which are; to maintain existing forest expansion areas of 2011 without further expansion and direct future treated wastewater to Agriculture Expansion areas, to modify Wastewater Reuse Code to allow for expansion in permissible agriculture crops cultivation on treated Wastewater according to international standards (e.g. new WHO guidelines), to develop governorate specific plans by matching Agriculture expansion plans with urban development plans, WSS plans, and Water Resources Management plans, and to embrace an out of Valley scenario for Urban Expansion.

At the end, Dr. Abuzeid proposed Inter-ministerial agreement and role of concerned ministries as listed below:

- Ministry of Agriculture and Land Reclamation role is to Select the crop composition according to the wastewater reuse code and water quality, to allocate the areas that can be cultivated in cooperation with the HCWW and MWRI, to supervise and controlling the agricultural process, to put and applying the laws to prevent violations of farmers, to control the reuse of treated sludge in agriculture according to law 254 for year 2003 and to control and supervise the quality of organic fertilizers.
- Ministry of Industry and Foreign Trade role is to regularly compile and disseminate data that shows quality and quantity of water usage and disposal from the factories, to prevent untreated industrial disposal into water bodies, to register all

nonregistered factories, to ensure the existence of treatment plants inside the factories before giving the required license for the factories to operate, and to ensure the operation of the treatment units in the factories at license renewals.

- Ministry of Environmental Affairs role is to confirm the operation of the treatment plants inside the factories, to monitor the industrial effluents water quality, and to make sure appropriate treatment is included in EIAs and Strategic EIAs of industrial zones
- Ministry of Health and Population role is to supervise the quality control and quality standards of the treated wastewater, to supervise the quality control of the treated wastewater used in agriculture and to supervise the quality control of the treated industrial wastewater quality drained in water ways.
- Ministry of Drinking Water and Sanitation Services role is to specify the land areas to be cultivated directly or indirectly by treated wastewater in cooperation with the Ministry of Agriculture, to regularly indicate the treated wastewater quality and quantity that should drain into agricultural drains and that could be directly reused, to confirm the operation status of the treatment and to control the quality standards of treatment, to explore agriculture reuse investment opportunities to share cost, and to allocate and supervise the industrial wastewater drainage to the sanitation network.

DR. MOHAMED ISMAIL IBRAHIM, VULNERABILITY & ADAPTATION MANAGEMENT GENERAL DIRECTOR (EEAA), he started by stating that Egypt's large and dense packed population makes the country extremely vulnerable to climate change. Egypt does not produce enough food to feed its current population. Its water resources also are rather limited. Moreover, The studies have indicated that the following areas are the most vulnerable in order of severity and certainty of results: agriculture, coastal zones, aqua-culture and fisheries, water resources, human habitat and settlements, and human health.

He explained the Greenhouse Gasses GHG as Its gases have the unique property as absorb part of the infrared reflected by the surface of the Earth and contribute thereby to heat the planet's surface in the same way that heats the greenhouses used in the field of agriculture, and some greenhouse gases present naturally in the atmosphere, such as water vapor, carbon dioxide and methane, is that human activities such as the use of oil fuel and coal and the uprooting of trees contributed to an increase in the concentration of these gases in the atmosphere and is what has contributed and is still in the strengthening of global warming and therefore high rates of temperature on the surface of the earth. And he added the Greenhouse effect which is a phenomenon confined atmosphere, some of the sun's energy to heat the earth and maintain a moderate climate. Carbon dioxide is one of the main gases that contribute to the doubling of this phenomenon is produced during the burning of coal, oil and natural gas in power plants, cars and factories, etc., in addition to deforestation widely. Other greenhouse gases that affect are: Methane from rice farms, cattle breeding, waste landfills, occupancy mines and gas pipelines, CFCs (Chlorofluorocarbons) responsible for the erosion of the ozone layer and Nitrogen Oxides.

Then, Dr. Ismail mentioned in brief the Human role in strengthening the global warming; Many theories since the mid-nineteenth century Showed that certain gases to the atmosphere of the Earth like carbon dioxide, methane and nitrous oxide due to trap heat and contribute to the heating of the earth. At the beginning of the twentieth century gave Swedish scientist Arrhenius idea that emissions of greenhouse gases in the atmosphere would lead to higher temperatures and thus climate change on the planet if Although the idea of the impact of humans on the Earth's temperature occurred a hundred years ago almost, but scientists did not they could only confirm this phenomenon since a relatively short period. Scientists confirm that humanitarian activities and since the Industrial Revolution Horn of nineteenth-contributed and are still in the strengthening of global warming through the secretion of large amounts of greenhouse gas atmosphere such as carbon dioxide resulting from the burning of fossil fuels such as coal shale oil to generate the energy needed by the human development.

Then, he is stated importantly the proposals for combating climate change as shown below:

- Logical solution optimized to address climate change is to stop emissions significantly (solution includes matters related to the global economy).
- The text of the Kyoto Protocol (1997) on the general principles to stop emissions of greenhouse gases. At a meeting in Bonn, 23/7/2001, approved more than 180 countries of the Kyoto Protocol and made him a legal treaty, but the United States pulled out of the climate negotiations and did not sign the Kyoto Protocol in Bonn meeting, and the United States has produced more than a quarter of contamination world carbon dioxide.
- Forestry and changing agricultural practices.
- Guided by the use of traditional energy sources.
- Reduce dependence on fossil fuels as the primary source of energy and seek forward to providing clean energy sources (renewable energy production from wind, water and sun).
- Recycling & walking and the use of mass transportation and reduce consumption (Turning Down) and lights-out time of departure (Switching Off) and change behaviors.

After wards, he briefed the preventive measures ; to reduce the risk of flooding and reduce the pace of this matter requires speed to take the necessary measures to control high groundwater levels are as follows: immediately stop of domestic exchange in groundwater in all the villages of the provinces of the Delta and the work covered drainage systems to reduce groundwater levels and all coastal cities, to reduce leaching rates of irrigation water to groundwater through the use of modern irrigation methods alternative to flood irrigation methods or a few crops farming water consumption with improve networks of agricultural drainage, the Expansion in groundwater use the alternative to surface water in irrigation operations, the use of groundwater to irrigate landscaping Channel and Delta cities, and water re-use and recycling to reduce waste and reduce its negative effects.

At the end, he concluded that the preventive measures can be through The expansion in the construction of waves walls along our coasts especially in North low of them and in front of the watercourses and the Nile Delta will not be with the effectiveness meaningful protection from flooding coastal areas unless it is to control the continuing rise in groundwater levels to those areas which may increase the problem complex to include flooding the coastline groundwater.

Dr. Khaled AbuZeid, Regional Water Resources Programme Manager, CEDARE and General Secretary, Egyptian Water Partnership, He presented the 2030 Alexandria Integrated Urban Water Management Plan, by stating the current condition in Alexandria Governorate which are; 4 Million Inhabitants (2011), Alexandria accounts for about 5.5% of Egypt's Population and for almost 8% of the country's GDP, It embraces a coast line of 70 kilometers and is home to 40% of Egypt's industrial establishments, The Nile River supplies over 95% of Alexandria's water demand and The city receives rainfall of less than 200 mm/year.

He also stated that concerning the Strategic Planning in a Nutshell that Ten studies were prepared, covering the base for the strategic planning team to develop a plan for the year 2030; eight of them are directly related to water supplying/saving options. and the the data were collected for the city water resources covering the history of the water system in Alexandria, describing the current and future water demand as well as the activities and responsibilities of different stakeholders including Ministry of Water Resources and Irrigation (MWRI), Alexandria Water Company (AWCO), Alexandria Sanitary Drainage Company (ASDCO), and other institutions involved in water management. A vision for water demand management in the City of Alexandria was developed and formulated by the Learning Alliance (LA). Possible scenarios for the anticipated future water system in Alexandria City were described. The potential amounts of water that may be made available by eight strategic options to satisfy future water demand were studied. The strategies were evaluated, costed, and ranked.

Dr. AbuZeid ended his presentation by stating the Strategic Options for GROUNDWATER POTENTIAL, STORM WATER POTENTIAL, WATER DEMAND MANAGEMENT POTENTIAL; it was proven that 20 MCM could be made available annually by minimizing physical and commercial losses from pipe network, Increasing the drinking water tariff gradually could save 60 MCM annually starting from 2030; this amount corresponds to the value of monetary savings resulting from an average tariff increase of 5%, and Maximizing household water use efficiency is estimated to save 44 MCM annually, WASTEWATER REUSE POTENTIAL (900 MCM/YR), AGRICULTURAL DRAINAGE REUSE POTENTIAL, SEA WATER DESALINATION POTENTIAL; It has been shown that if sufficient funds are available, the maximum amount of desalinated water could reach up to 777 MCM annually starting from 2030, based on the needs of some particular coastal areas. The locations where the desalinated water can be used have also been determined. Moreover, a desalination system that could produce up to 2.13 MCM of desalinated water daily has been proposed, 366 units of the proposed system will be needed to produce the above mentioned daily amount. URBAN WATER REUSE POTENTIAL; Three strategic alternatives have been assessed, these are Grey water reuse, roof water reuse, and road water reuse, the Aquacycle model has showed that these options could introduce 23, 14, and 25 MCM annually to the Alexandria water budget respectively.

4. RECOMMENDATIONS:

After 2 days of presentations, working groups, and discussions, the workshop participants came out with the following recommendations:

- The necessity of directing national subsidy to sanitation instead of less deserving sectors such as transport.
- The importance of public private partnerships in bridging the sanitation financial gap by building 300 additional treatment plants. There are specific areas in Upper Egypt where agriculture on treated wastewater have been foreseen, these areas represent a good opportunity for investors.
- The importance of changing the cropping patterns in the Nile Delta as a strategic Climate Change adaptation measure. Crops with high tolerance to salinity should be introduced to agricultural areas close to the Mediterranean.
- The importance of developing Integrated Coastal Zone Management (ICZM) plans for all coastal governorates and cities, these plans should consider natural coastal protection measures such as sand dunes, along with other structures such as seawalls. The plans should also consider the protection of the coastal highway.
- The importance of developing coastal protection policies that go in line with ICZM plans, such policies should specify a distance from the coast where no further development will be permitted.
- The necessity of prohibiting building new cities targeted for one million inhabitants or more.
- The importance of studying the effects of dams at the Nile upstream countries on Egypt's water resources.
- The importance of strategic and efficient use of renewable and non-renewable groundwater resources, and the introduction of new strategic measures that include artificial aquifer recharge.
- The Necessity of updating the national hydrographic database and maps.
- The importance of having accurate data that is consistent among different water related sectors.
- The utmost necessity of data sharing and coordination of activities between different national water related sectors.
- The necessity of applying modern irrigation.
- The necessity of manufacturing seawater desalination equipment locally.
- The importance of making alternative energy sources available by manufacturing solar energy production equipment locally.

- The importance of applying law 48 for 1982 with some modifications that could create more flexibility for treated wastewater reuse in agriculture.
- The need to apply the fundamentals of “Green Economy”.
- The need to consider the establishment of clusters of low cost treatment plants, especially in small villages.
- The utmost importance of having an advanced Monitoring and Evaluation system.
- The importance of precisely studying potential projects related to the Qattara Depression.
- The importance of developing regional and local numerical models to assess climate change impacts on the Nile Delta.
- The importance of rehabilitation of both Nile branches for navigation.
- The importance of rehabilitation of a great number of pumping stations along the Nile.
- The necessity of technical capacity building across the whole water sector, especially with respect to crisis management.

ANNEXES

WORKSHOP ON

BUILDING CLIMATE RESILIENCE IN THE NILE DELTA URBAN WATER MANAGEMENT FOR EFFECTIVE SOLUTIONS

16th – 17th of June 2013, Cairo, Egypt

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MEDIA COVERAGE

فى ندوة دولية

تبادل الخبرات مع أوروبا لمواجهة التغيرات المناخية

كتب - أحمد نصر الدين:

حذر الدكتور محمود أبو زيد، رئيس الشراكة المائية المصرية، من مغبة الأخطار التى تواجه مناطق التنمية بدلتا النيل، التى تتزايد احتمالاتها بالتغيرات المناخية، وارتفاع درجات الحرارة، وقلة الموارد المائية السطحية والجوفية، فى ظل الزيادة السكانية فى المحافظات الواقعة بها، والذين تنمو انشطتهم التنموية والصناعية. جاء ذلك خلال افتتاحه امس للندوة الدولية التى نظمتها الشراكة بالتعاون مع نظيرتها الدولية وممثلى عدد من الدول الأوروبية والإفريقية، لتبادل خبرات التصدى للتحديات التى تواجهها، والعمل على زيادة كفاءتها للتعامل مع التغيرات المناخية. وقال ابو زيد ان الزحف العمرانى وتداخل مياه البحر المالحة مع المياه الأرضية للمساحات الزراعية الواقعة بالدلتا تعد من أهم التحديات التى تعمل مصر لمواجهتها ضمن الاستراتيجية العامة للدولة.

من جانبة طالب الدكتور محمد بهاء الدين، وزير الموارد المائية والري، بضرورة العمل على ترشيد استخدامات الموارد المائية المتاحة، والبحث عن مصادر جديدة لتعويض النقص الحاد فى الموازنة المائية المصرية، رغم رفع كفاءة استخدام المياه فى قطاع الزراعة الذى يستهلك نحو ٦٧ مليار متر مكعب سنويا من حصة مصر المائية، ونحو ٩ مليارات متر مكعب سنويا تخصص لأغراض الشرب، ومثلها لاحتياجات قطاع الصناعة

ELAHRAM NEWSPAPER

18 JUNE 2013

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ت: ٦٦٣# ٢/٣/٤ /٣٩٢١ –٢٤٥١ (٢٠٢) فاكس : ٣٩١٨ – ٢٤٥١ (٢٠٢)
Web site: www.egyptwaterpartnership.org

PRESENTATIONS

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Web site: www.egyptwaterpartnership.org

Enabling Delta Life in (The Nile Delta, Egypt)

1

What are the 4 main delta-issues in your delta?

- **Competing and escalating demands**: Different sectors are competing over water, with the growing population and the evolving industry, the agricultural sector is facing a growing competition. The sector of the highest national consumption, in itself also has competing demands of its own, especially between upstream and downstream farmers.

What are the 4 main delta-issues in your delta? (Cont'd)

- **Water Quality Degredation and Pollution**: caused by Inadequate treatment of municipal and industrial waste water.
- **Ground Water Depletion and Sea Water Intrusion:** caused by excess pumpage of groundwater and excessive granting of well permissions.
- **Coastal Shore Erosion and Sea level rise**.

What measures are you preparing / did you take to deal with these issues?

- EWP was part of a nation wide dialogue on treated wastewater reuse as a measure for decreasing competition over conventional water resources.
- EWP facilitated the establishment of water treatment plants and low cost sanitation schemes in rural areas of the Nile Delta.
- EWP organized a seminar on the future of water in Egypt.
- EWP coordinated a focus study and organized workshops on industrial areas' water impacts in the delta.

What measures are you preparing / did you take to deal with these issues? Cont'd

- EWP was part of a future planning process for the coastal city of Alexandria that depends entirely on the Nile, developing what has been known as the Alexandria 2030 Integrated Urban Water Management (IUWM) plan. One of the main objectives of that plan is reducing the pressure on the Nile Delta by developing non-conventional water resources where possible.

How did you organize / are you organizing the process for developing this?

- Constantly in contact with decision makers and different stakeholders.
- Continuously facilitating technical Dialogue through workshops.
- Disseminating knowledge through publications.
- Organizing awarness campaigns and public events.
- Developing project concept notes and proposals.
- Giving awareness presentations.

EWP Website

أنشطة ميدانية

شمنديل

أشليم

What was the most difficult part in your process so far?

- Lack of harmonization between different sectors, which is emphasized the most by mismatching Water, Agricultural, and Urban development policies.

What 3 suggestions do you have for a country that is just starting to think about their delta?

- Watch for trends of urban encroachment on Deltas.
- Monitor pollution sources and water quality.
- Identify all competing uses and get stakeholders consensus on ranking them by priority.

Workshop on
Building Climate Resilience in The Nile Delta Urban Water Management for Effective solutions
16the – 17the of June 2013, Cairo, Egypt

Sea water intrusion in the Nile delta aquifer

By
Prof. Dr. Madiha Mustafa Hassan
Ministry of water resources and irrigation -Egypt

Contents

- Annual water resources in Egypt
- Role of Groundwater to the Country
- Groundwater management issue and constraints
- Challenges related to WRM
- development area in Egypt
- SWI in the Nile delta aquifer
- Solutions to stop increments of SWI
- Conclusion and recommendations

Annual Water Resources in Egypt

1- River Nile (55.5 BCM)

2- Groundwater

- *Groundwater in Nile Valley and Delta(4.5 -8.4bcm)*
- *Groundwater in the Desert area ,Sinai &western desert*

3- Drainage water reuse 3.5BCM(1997)-7.4BCM(2017)

4- Treated wastewater

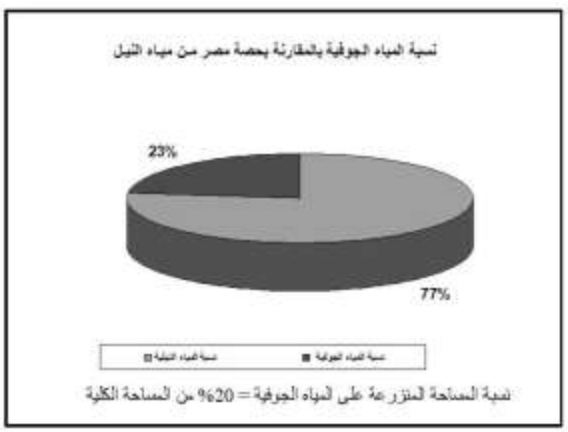
5- Rainfall and flash floods in Wadis(1.3BCM

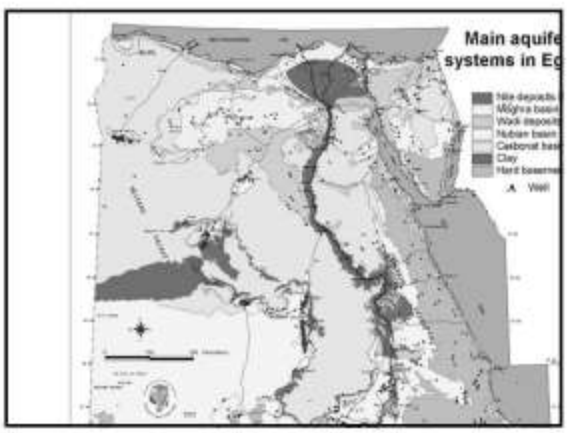
6- Desalination of sea water or brackish groundwater(50MCM)

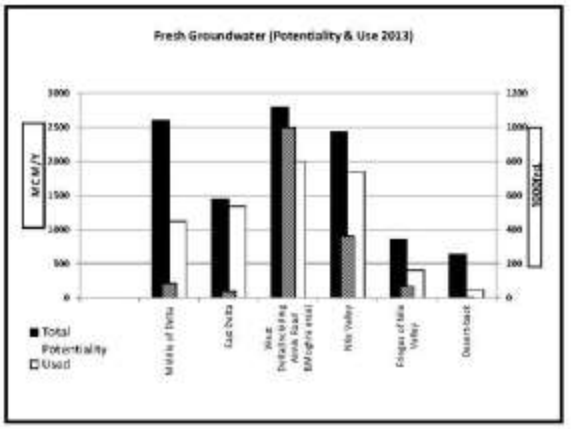
Importance of groundwater to the country

Water resources in the country can be summarized as follows:

- A system related to the *Nile*...*One point delivery at Aswan Dam.*
- Groundwater systems...*Distributed with different characteristics and potential.*
- Flash Flood in Wadis...*Localized but with a wide distribution.*
- Rainfall...*Scarce, Uncertain, Irregular*







Groundwater Management-Issues and Constraints

- Estimation of groundwater potential is an important step that should be carried out carefully prior to planning groundwater development. However, potential may be affected (positively or negatively) by the applied management technology and constraints/issues facing groundwater use and allocation. An effort is made in this section to classify development technologies and major issues facing groundwater development and management. Moreover, potential functions of aquifer systems are discussed as a mean to support allocation decisions.

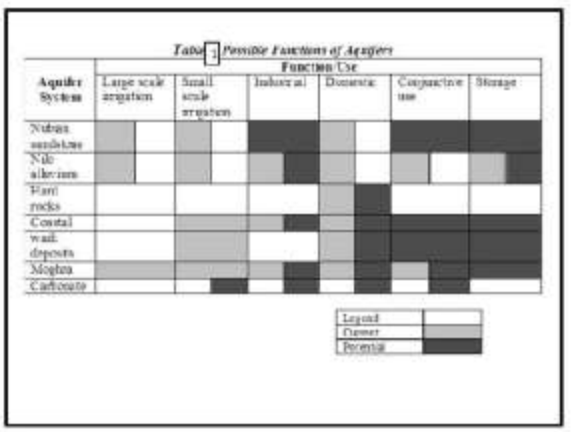


Table 1 Possible Functions of Aquifers

Aquifer System	Function/Use					
	Large scale irrigation	Small scale irrigation	Industrial	Domestic	Conjunctive use	Storage
Nubian sandstone						
Nile alluvium						
Hard rocks						
Coastal						
wadi deposits						
Moghra						
Carbonate						

Legend: Current; Potential

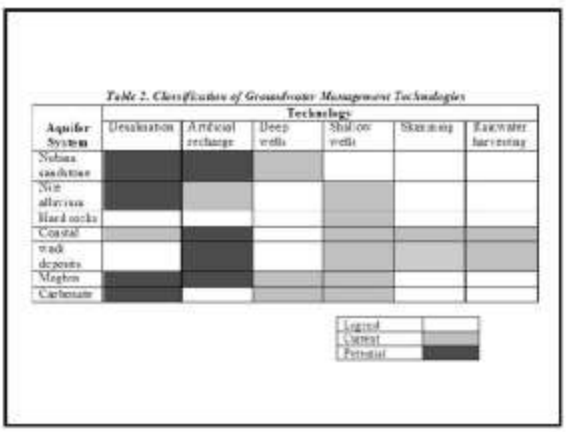


Table 2. Classification of Groundwater Management Technologies

Aquifer System	Technology					
	Desalination	Artificial recharge	Deep wells	Shallow wells	Skimming	Rainwater harvesting
Nubian sandstone						
Nile alluvium						
Hard rocks						
Coastal						
wadi deposits						
Moghra						
Carbonate						

Legend: Current; Potential

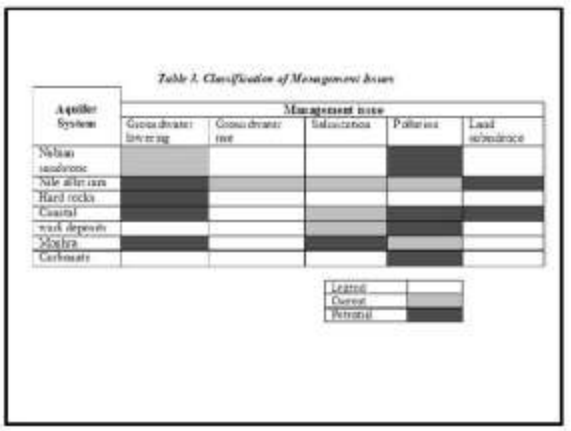


Table 3. Classification of Management Issues

Aquifer System	Management issue				
	Groundwater lowering	Groundwater rise	Salinization	Pollution	Land subsidence
Nubian sandstone					
Nile alluvium					
Hard rocks					
Coastal					
wadi deposits					
Moghra					
Carbonate					

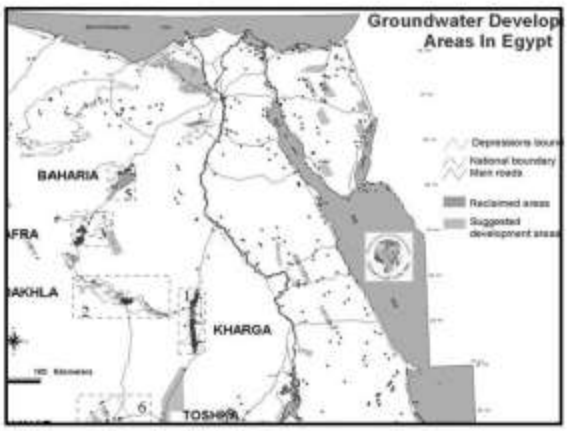
Legend: Current; Potential

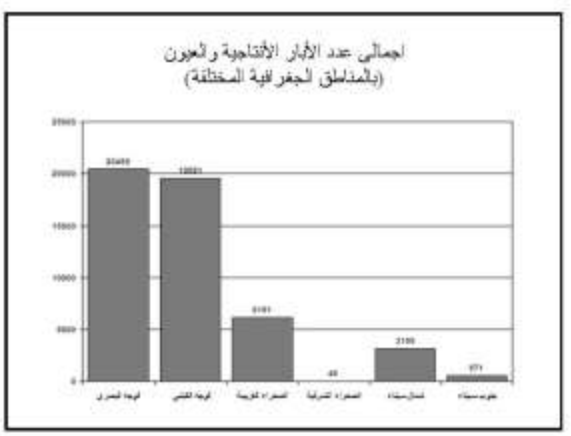
Challenges

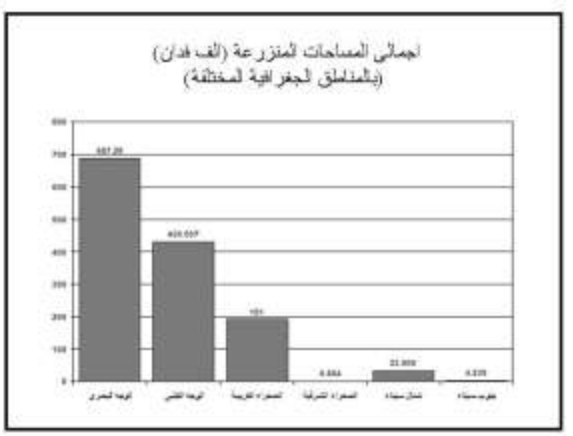
- *First Set: Population Growth*
  - Population growth against constant quota from the Nile.
  - Population growth against a constant inhabited physical area.
  - Uneven distribution of water resources over the country physical area.
  - Population growth against a decrease in arable land.
- *Second Set.. Inappropriate management of Groundwater and Related Water Resources*
  - Poor control on wells drilling.
  - Poor control on flowing wells.
  - Sustainability of non-renewable groundwater.
  - Allocation of groundwater to uses does not make use of the comparative advantage.
  - Inappropriate rain water harvesting techniques.
  - Inappropriate protection works from flood risks.
- *Third Set.. Climate Change*
  - Less rainfall on the Nile basin resulting in less water reaching Aswan.
  - Sea water rise and resulting sea water encroachment to the coastal aquifers.
  - Cycles of drought and high rainfall on the coastal areas.
  - Cycles of flash floods and drought in wadis.

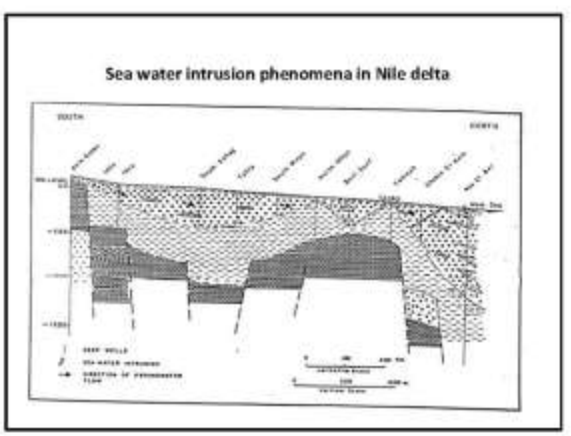
cont.

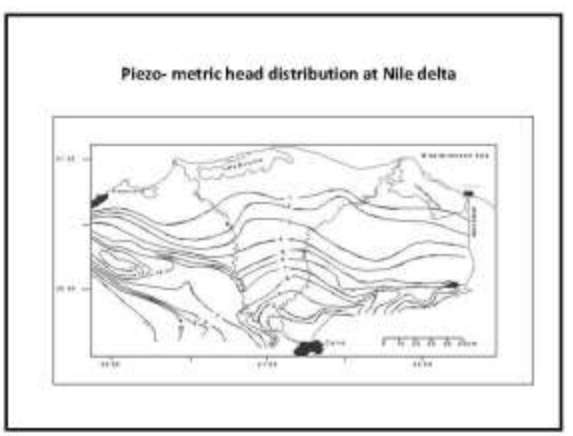
- *Fourth Set...Pollution*
  - Poor awareness with respect to groundwater pollution (confusion between pollution of water wells and the whole storage in various aquifers.
  - Water supply is not accompanied by sanitary drainage and treatment.
  - Uncontrolled reuse of agricultural drainage.
  - Uncontrolled dumping of solid wastes.
  - Poor protection of well heads and well proper (drinking water wells).
- *Fifth Set...Poor Knowledge on Other possible sources of water*
  - Some sources of water are not receiving attention (Non-fresh groundwater), irrespective its wide distribution and economic use.
- *Sixth Set...Poor Decentralization, Participation*
  - Participation in water management is very poor.
  - Decentralization is not applied.



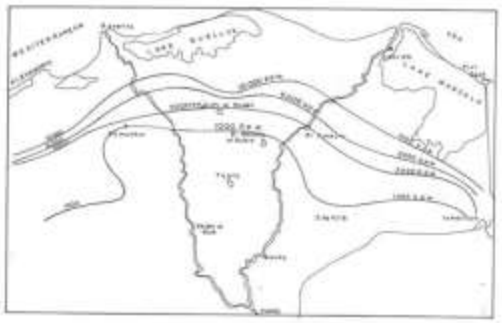




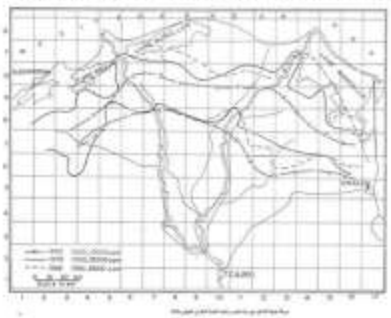




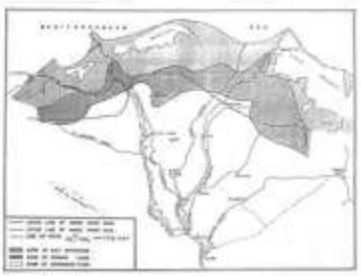
Iso- salinity line distribution at Nile delta



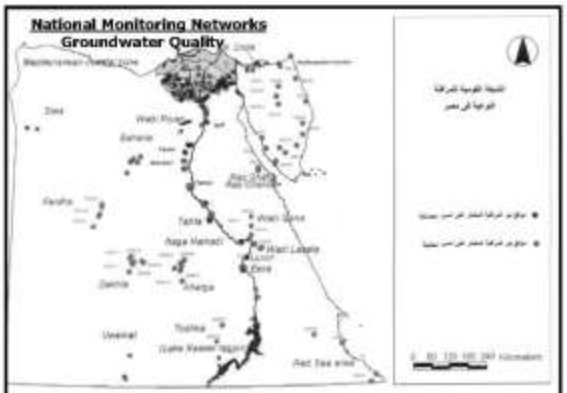
Movement of Sea water intrusion in Nile delta



Upward and downward zone at Nile delta



National Monitoring Networks
Groundwater Quality



Ground water quality program in Egypt

- Network design (according to certain criteria) and executed through EMGR project
- 210 observation wells at Delta ,upper Egypt, Eastern and Western desert and Sinai
- Round each year
- Samples taken start at year 1998
- 50 parameter (physiochemical, major captions, anions, trace metals, microbiological) were analyzed for each well each round at CLEQM

National Monitoring Networks

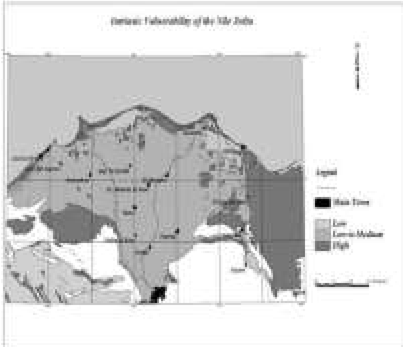
Groundwater Quality

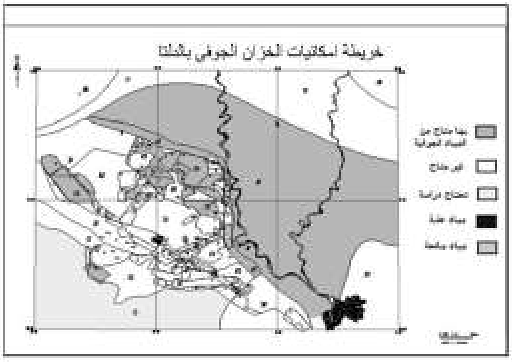
At present about 200 monitoring points are being sampled and analyzed for about 50 parameters. Sampling frequency is once a year. Six monitoring rounds have been completed since the national network was established.

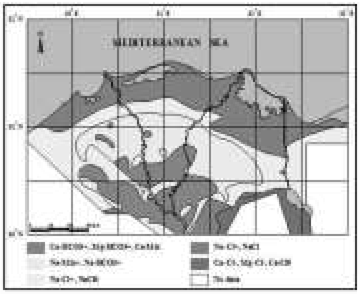
Region	Cairo	Delta	Nile Valley	Eastern Desert	Western Desert	Total
Number	12	51	55	42	43	203

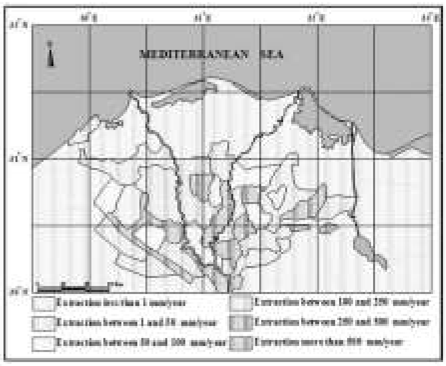
RIGW

Vulnerability to pollution at Nile delta aquifer



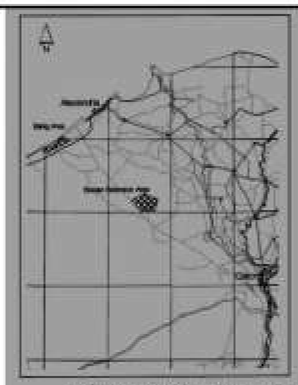






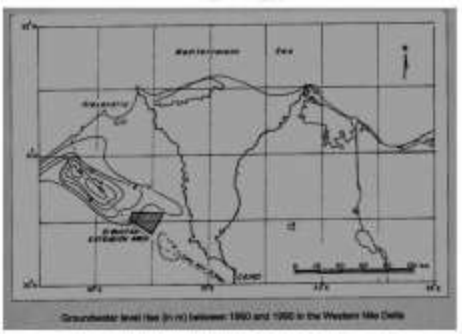
CLASSIFICATION OF ARTIFICIAL RECHARGE POTENTIALITIES IN EGYPT ACCORDING TO AREA, SOURCE AND OBJECTIVE

AREA	SOURCE OF RECHARGE WATER AND OBJECTIVE OF ARTIFICIAL RECHARGE					
Region and example of location	Harvested rainwater	Nile winter excess flow	Regular Nile flow	Excess irrigation water	Agricultural drainage water	Sewage and drainage water
COASTAL AREAS						
WESTERN DESERT * Bahig – El Hammam Canal area * Wadis between Alamein and Salum	1. Storage 2. Prevent salt water intrusion	1. Storage 2. Prevent salt water intrusion		1. Storage 2. Improve irrigation management	1. Purification 2. Storage	1. Purification 2. Storage
SINAI-MED. COAST * Wadi el Arish Delta						
SINAI-GULF OF AQABA AND SUEZ * Taba – Nuweiba * Wadi Feiran						
EASTERN DESERT * [illegible] * Safaga and Quseir						
NILE DELTA AND VALLEY FRINGES * El Mullak area * El Bustan Extension Area * [illegible]		1. Storage 2. Improve irrigation management		1. Storage 2. Improve irrigation management	1. Purification 2. Storage	1. Purification 2. Storage
NILE BANKS AND ALONG MAIN IRR. CANALS * Beni Suef			1. Purification 2. Storage			
WESTERN DESERT Wadi el Farigh		1. Prevent aquifer depletion 2. Storage				1. Purification 2. Prevent aquifer depletion



General location map of experimental sites for artificial recharge

Uncontrolled artificial recharge in Egypt



امكانات حصاد مياه السيول والامطار
(تقدير مبدئي)

المنطقة	الهطول المطرى والسيل مليون م3/ سنة	امكانات الحصاد المائي مليون م3/سنة
الساحل الشمالى الغربى	625	(%14) 100- 80
شمال سيناء	353	(%21) 80-70
جنوب سيناء	280	(%14) 50-30
الصحراء الشرقية	613	(%4) 30 – 20
اجمالى	**1871**	**(%12) 270-200**

تقييم مبدئي لمخزون المياه الجوفية غير العذبة

الموقع	الحوض / التكوين	المحتوي الكلى للاملاح جزء/ مليون	المخزون مليار متر مكعب
السواحل المصرية	ورديان – حجر جيرى	اكبر من 2000	2
حواف الوادى والدلتا والساحل الشمالى	النيل	اكبر من 1500	4
غرب الدلتا	المغرا	اكبر من 3000	1
الصحراء الغربية	الحجر الجيرى	اكبر من 3000	5
الصحراء الشرقية وسيناء	الحجر الرملى النوبى	3000 – 1500	100
اجمالى الجمهورية	**كل الاحواض**		**112**

Conclusion and recommendations

•The main source of water in Egypt is the Nile, which originates outside the country ,Rainfall is very limited with respect to its geographical and temporal distribution and rates. The other source of fresh water is the groundwater that represents about 20% of the available fresh water resources.

•The impact of the expected climatic changes will pose additional stress on the ecological and socio economic system on Egypt which already under pressure.

• The rain in Egypt is very rare the max annual density is 200 mm near the coast and it decrease inland until it reach zero near Cairo, part of this rain infiltrate and recharge the aquifer or used as a supplemental irrigation, the rest runoff to the sea unless there is rainwater harvesting project.

Recommendations

- Continuous update of the hydro geological study (potentiality)
- Awareness program for the investors (Safe yield well license)
- Enforce the regulations and the guideline for better management
- Check the impact of the existence development of the groundwater level
- Increase capacity building(tool kit)

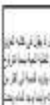
Thank You

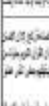
الجمهورية اليمنية
وزارة التربية والتعليم

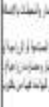
أدوات المختبرات والمشاغل المدرسية والعلمية

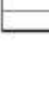
مهندس / السيد حيدر

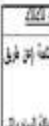
المقدمة

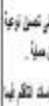


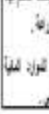












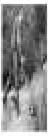
دور الوزارة في صيانة المخازن المدرسية

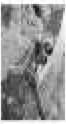
تقسم اعمال الصيانة في [2] قسم طبقاً لطريقة التنفيذ :-

1. الصيانة الميكانيكية
2. الصيانة الكهربية
3. الصيانة الميكروبية

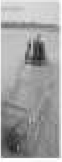
(أ) الصيانة الميكانيكية:

2) الصيانة الدورية





3) الصيانة البيولوجية



مصادر التلوث

تتمثل مصادر التلوث بالمجاري المائية في الآتي :

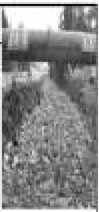
- الصرف الصحي
- الصرف الصناعي
- الصرف الزراعي (نتيجة استخدام الأسمدة والمبيدات)
- المخلفات الصلبة

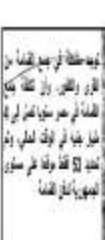
أولاً : الصرف الصحي

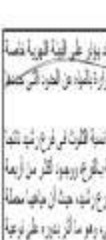
ثانياً : الصرف الصناعي

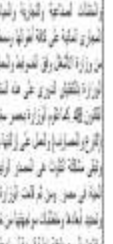
ثالثاً : الصرف الزراعي

رابعاً: المخلفات الصلبة









•كما أنشأت الوزارة برامج للرصد والمتابعة لنوعية المياه ببحيرة السد العالي، ونهر النيل وفرعيه، والترع والمصارف والمياه الجوفية لمراقبة أي تغير يحدث بالنوعية للمياه والعمل على إزالة المسببات لتغير النوعية وقد قامت الوزارة بإنشاء شبكات رصد ومراقبة نوعية المياه من خلال 300 موقع قياس للمياه السطحية و 250 نقطة مراقبة للمياه الجوفية يتم من خلالها قياس جميع العناصر الطبيعية والكيميائية والميكروبيولوجية وبقايا المبيدات في المياه بصفة دورية ومن ثم يمكن تحديد مصدر التلوث والعمل على إيقافه.

•وقد شاركت الوزارة بالتعاون مع وزارة الإسكان والمجتمعات العمرانية ووزارة الزراعة واستصلاح الأراضي في إعداد الكود المصري لاستخدام مياه الصرف الصحي المعالجة في الزراعة (كود رقم 501-2005) وتم الاعتماد فيه على دليل منظمة الأغذية والزراعة (FAO) ومنظمة الصحة العالمية (WHO) وغيره من مراجع أوربية وعربية كمراجع أساسية.

•كما بدأت الوزارة في تطبيق نظام مشاركة المنتفعين في التشغيل من خلال إنشاء مجالس المياه لتكون مسئولة عن إدارة وتوزيع المياه على مستوى الترع الفرعية التي تغذي المساقي، والحد من التلوث ووقف إلقاء المخلفات الصلبة في المجاري المائية هذا بالإضافة إلى إنشاء وحدة التوعية والإعلام المائي والقيام بحملات التوعية للحد من التلوث والتعدي على المجاري المائية

التكامل بين الوزارات والأجهزة المختلفة لحماية المجاري المائية من آثار التلوث

الخلاصة والتوصيات للحد من الآثار الخطيرة للصرف الصحي والصناعي والمخلفات الصلبة على نهر النيل والترع والمصارف الزراعية ودور كل من الحكومة والقطاع الخاص والمجتمع المدني في حماية المياه من التلوث والتوعية البيئية للحفاظ على نوعيتها وذلك على النحو التالي

✓**دور الدولة**

متمثلا في وزارة الموارد المائية والري والبيئة والزراعة وغيرها من الوزارات والهيئات الحكومية الأخرى لعمل الآتي:

•اتخاذ كافة الإجراءات اللازمة لتطبيق القوانين الخاصة بحماية المجاري المائية .

•عمل الاحتياطات اللازمة لمنع تسرب مياه الصرف الصحي إلى مياه نهر النيل .

•التشديد على عدم صرف مخلفات المصانع سواء كانت سائلة أو صلبة في المجاري المائية .

•إنشاء مراكز قياسات ثابتة على المجاري المائية لمراقبة التلوث الذي يطرأ عليها.

•ضرورة الالتزام الصارم للمصانع وجميع المنشآت بالقوانين الخاصة بحماية المجاري المائية وحماية البيئة وخاصة القانون 48 لسنة 1982 والقانون 4 لسنة 1994 لحين تعديل القوانين الحالية لتكون أكثر إلزاما عن طريق وضع معايير الصرف الملائمة وتغليظ العقوبات على المخالفات حسب نوع وحجم الملوثات بالصرف لمواجهة المتغيرات الاجتماعية والاقتصادية التي طرأت على المجتمع واستخدام التكنولوجيا الأقل تكلفة لوقف تلوث المجاري المائية .

•مساعدة المصانع لتوفيق أوضاعهم ومعالجة صرف مخلفاتهم داخليا .

•توفير الاعتمادات اللازمة لمنظومة المخلفات الصلبة بالقرى .

•تحديد جهة أو هيئة تتولى شراء منتجات مصانع التدوير مما يساعد على توفير فرص عمل للشباب بالقرى واستدامة المنظومة .

•تفعيل دور إدارة المخلفات الصلبة تنفيذاً لقرار السيد رئيس مجلس الوزراء والتي أنشئت بالتعاون بين وزارتي البيئة والتنمية المحلية لمراقبة وتقديم الدعم الفني للمحافظات في عملية التخلص الآمن من القمامة .

•سن تشريع يسمح للمحافظين بالتعاقد بالأمر المباشر مع شركات النظافة والمستثمرين للتخلص من القمامة .

•قيام وزارة الزراعة بالموافقة على تخصيص الأراضي المطلوبة لإقامة مصانع تدوير القمامة بجميع أنواعها ومساحاتها وفقا للمتطلبات الخاصة بكل جهة حيث أن الصحة العامة أغلى وأثمن شئ.

•تفعيل القوانين وتنفيذها على المخالفين من خلال السادة المحافظين مع الأجهزة المعنية.

•تقديم الدعم الفني للمحافظات لتشغيل مصانع تدوير القمامة المتعثرة حاليا ويمكن إسناد مهمة التشغيل والصيانة لمنظمات المجتمع المدني والمستثمرين من القطاع الخاص.

•ضرورة تكاتف جميع الجهات في إيجاد البدائل السريعة لمنع إلقاء المخلفات في الترع والمصارف وتوفير الخدمات اللازمة بالطرق المناسبة لجمع المخلفات في جميع القرى خاصة المطلة على الترع والمصارف وتطبيق التكنولوجيات الملائمة لتدوير القمامة.

•مراعاة الدور الإعلامي نحو التوعية وتسليط الضوء على التجارب الناجحة في هذا المجال كما يمكن إضافة التوعية داخل المناهج التعليمية بالمراحل التعليمية المختلفة.

✓**دور المجتمع المدني والقطاع الخاص**

متمثلا في المؤسسات الخاصة والمساجد والجمعيات الأهلية :

•تحريم وتجريم إلقاء الحيوانات الميتة في نهر النيل .

•عدم إلقاء القاذورات والمخلفات والمواد الصلبة والبلاستيكية في نهر النيل .

•نشر الوعي الصحي بين الفلاحين .

•نشر الوعي الزراعي بين المزارعين حيث يتم التنبيه بعدم غسل الأدوات ومعدات رش المبيدات الحشرية في مياه نهر النيل والمجاري المائية .

•تحريم استخدام مجاري المياه في الاستخدامات الجائرة التي يقوم بها البعض مثل غسل الأواني والملابس وتنظيف الحيوانات والاستحمام في مياه نهر النيل .

•التوعية بضرورة خفض مياه الشرب عن طريق عدم استعمال المياه في الاستخدامات المسرفة للمياه مثل رش الشوارع وغسيل السيارات بكميات كبيرة من المياه .

✓ الباحثين

•قيام الباحثين فى مجال المياه وأنهار النيل وغيرها بعمل أبحاث فى جميع مجالات المياه وقياس جودة المياه .

•إبتكار أساليب جديدة لتنقية المياه ذات جودة عالية وتكلفة بسيطة.

•محاولة اختراع أسمدة وكيماويات أقل ضررا بالمياه والأراضى الزراعية والمحاصيل .

•إبتكار أساليب جديدة لمعالجة مخلفات المصانع سواء كانت سائلة أو صلبة أو غازية وإعادة تدويرها مما يعظم من إستخدام تلك المخلفات والربح منها أيضا وبذلك تقوم الشركات والمصانع الأخرى بالتقدم إلى إستخدام مثل هذه التكنولوجيا .

•نشر تلك الأبحاث التى توصلوا اليها للمجتمع لتوعيته بأهمية إستخدام تلك الأدوات.

✓طلاب الجامعات

على جميع طلاب الجامعات أن يكونوا إيجابيين نحو المجتمع وذلك بتوعية المجتمع الذى يعيشون فيه بما توصل اليه من معلومات فى دراسته بالجامعة .وهنا يجب على الطالب أن يدرك أهمية المياه وما هي أنواع التلوث وما هي سبل الوقاية والعلاج حتى يقوم بتوصيل تلك الأفكار والمعلومات إلى مجتمعه .

بالإضافة بتوعية الطالب لمجتمعه بأهمية التعاون مع الوزارات المختصة والجمعيات الأهلية فى كافة الأنشطة للحفاظ على الثروة المائية ومنع السلوكيات التى تؤدى إلى تلوث المجارى المائية

الخاتمة

إن الجهد المبذول للحد من مخاطر التلوث بالمجارى المائية فى مصر يتطلب المزيد من الجهد وتضافر جميع العقول والسواعد المصرية والعمل الدؤوب فى المجالات المختلفة لتمهيد الطريق للحفاظ على مياهنا من التلوث وخطورته .

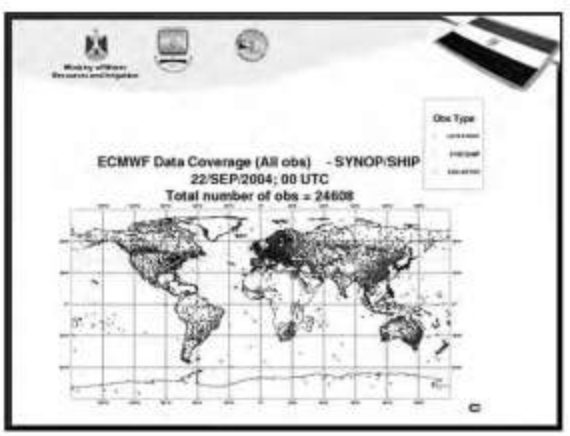
كما ولا يجب أن ننسى بضرورة دور المشاركة المجتمعية ومنظمات المجتمع المدنى للعمل جنبا الى جنب مع المنظمات الحكومية لمواجهة المشكلات البيئية الناتجة عن التلوث وتغيير سلوكيات المجتمع تجاه البيئة

وفقنا الله وإياكم لخدمة مصرنا الحبيبة وحمايتها من كافة الاخطار التى تحدق بها.

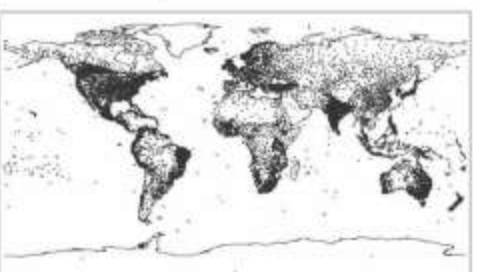
Nile Delta Coastal Works

Ibrahim Elshinnawy
Director of Coastal Research Institute (CoRI), Egypt

IPCC Considers the Nile Delta as one of the vulnerable areas of the world (Populated Deltas)



Rain Gauge Network 1950-2000



Mediterranean Hydrological Factors

Area = 2.5 million km2

Max Depth = 4400 m

Ave Depth = 1500 m

Water Vol. = 3.7 million km3

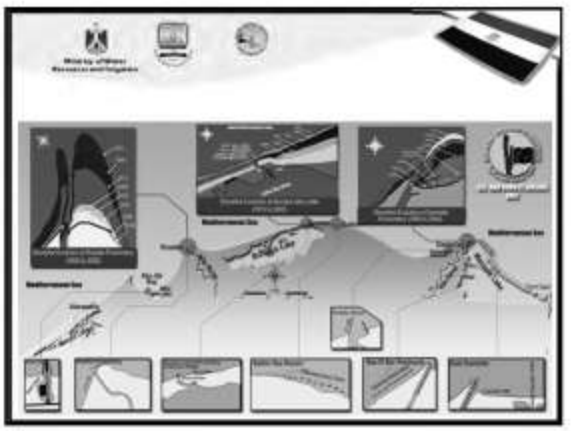
Water body comprises 3 layers with different temperature and salinity profiles

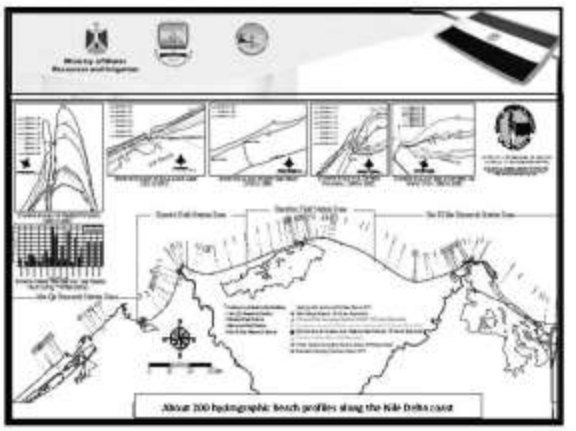
- **Surface layer (75-300 m depth)**
- **Intermediate layer (300-600 m depth)**
- **Lower layer (more than 600 m depth)**

Mediterranean Annual Water Balance

Evaporation	**4144 km3**
Income	
rainfall	**1000 km3**
River flow	**230 km3**
Black Sea flow	**152 km3**
Total Inflow	**1382 km3**
Deficit	**2762 km3**

This deficit is compensated by 40,000 m3/s from Atlantic Ocean through Gabal Tarek straight in an anti-clockwise flow as water level in eastern side of the sea is 80 cm lower than that in the ocean due to increased evaporation rates difference.



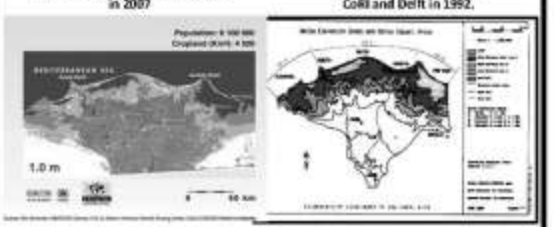


Results by CoRI & Delft (1992) and IPCC-4AR, (2007) are comparable

Because both studies ignored the morphological features of the coastal zone of the Nile Delta as (coastal sand dunes and ridges).

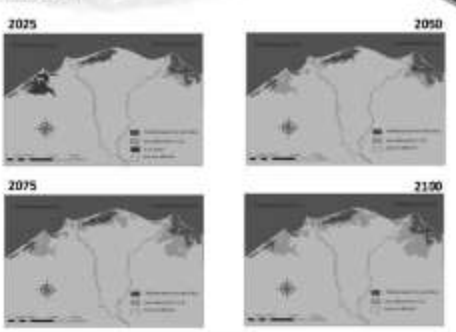
Vulnerable areas defined by IPCC in 2007

Vulnerable areas defined by CoRI and Delft in 1992.



Expected SLR Till 2100 by Projected Increase in Air Temperature (A1F1 Scenario)

Year	2025	2050	2075	2100
Temperature (°C)	1.2	2.2	3.2	4.0
ASLR at Alexandria	13.0 (cm)	34.0 (cm)	55.0 (cm)	72.0 (cm)
ASLR at Al-Burullus	14.75 (cm)	37.5 (cm)	60.30 (cm)	79.0 (cm)
ASLR at Port Said	27.9 (cm)	68.8 (cm)	109.6 (cm)	144.0 (cm)



Total affected area and its percentage to the Nile Delta area (A1F1 scenario)

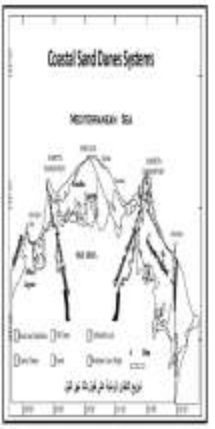
(With Mohammed Ali wall and zero level for lakes borders)

Year	2025	2050	2075	2100
Total Area Affected (km2)	701	766.5	2348	2938
Total % of the Nile Delta Area	2.8	3.1	9.4	11.75

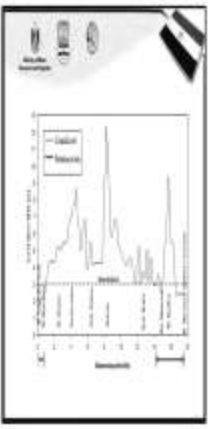
Protection Systems

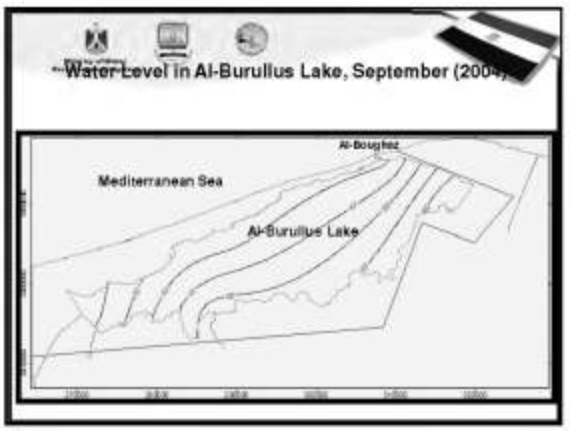
Natural and Man-made systems

- Coastal Sand Dunes
- The Embankments of Al-Salam Canal
- Boarders of the Coastal lagoons
- Mohammed Aly Sea Wall
- Protection Constructions
- Sea Front Corniche of Alexandria
- International Coastal Road



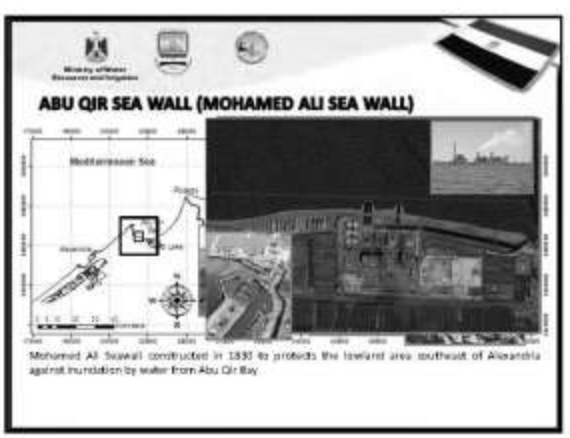
Section Number	Distance from the beginning of Al-Salam Canal (km zero at the Nile-Damietta Branch) (km)	Difference in soil levels between the canal bank and lake water (m)
1	9	7.25
2	21	7.84
3	31	7.23
4	37	7.4
5	50	7.25
6	61	7.45

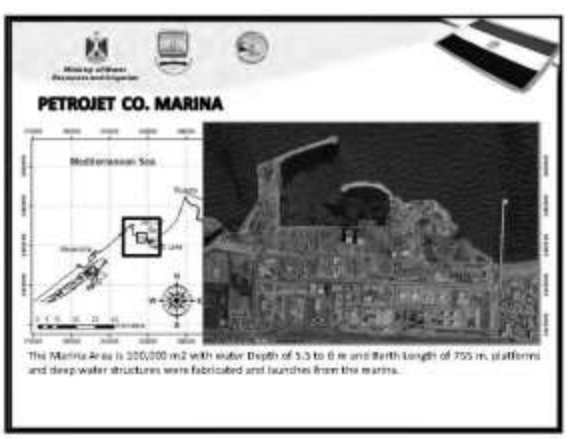



Water Level in Al-Burullus Lake, September (2004)
Mediterranean Sea
Al-Burullus Lake
Al-Boughaz

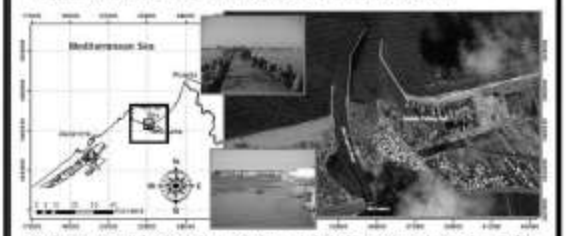

West New Port
(+1.5 m) - N
Berths (+2.0 m) - E
New Road (+2.15 m) S
Oriental Area
(+1.75 m) W


Coastal International Road


ABU QIR SEA WALL (MOHAMED ALI SEA WALL)
Mediterranean Sea
Mohamed Ali Seawall constructed in 1830 to protects the lowland area southeast of Alexandria against inundation by water from Abu Qir Bay


PETROJET CO. MARINA
Mediterranean Sea
The Marina Area is 200,000 m2 with water Depth of 5.5 to 6 m and Berth Length of 755 m. platforms and deep water structures were fabricated and launches from the marina.

IDKU LAGOON STRAIT AND MAADIA FISHING PORT

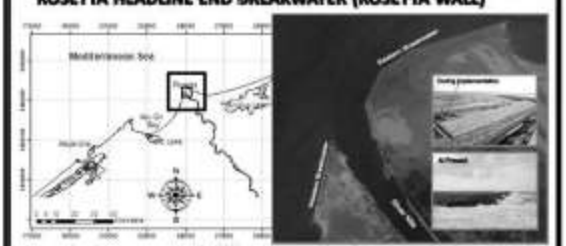


Idku Strait is the only junction between Idku lagoon and Abu Qir bay. the navigation channel of the Strait is protected by two breakwaters. These breakwaters were lengthening after constructing Maadia fishing port. On the other hand, Maadia fishing port was constructed in 1995. It Consists of 5 Berths. The Maritime area occupies 13 feddans.

WEST ROSETTA GROINS

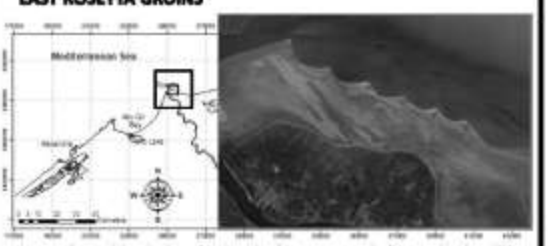
It is a set of 9 groins located just to the left of Rosetta western breakwater with about 650m distance in between (except the last 3 groins from the north which have 750, 550 and 450 respectively). These groins constructed during 2009 to treat the erosion process which take place as a side effect of implementation of Rosetta western breakwater at the breakwater sides.

ROSETTA HEADLINE END BREAKWATER (ROSETTA WALL)



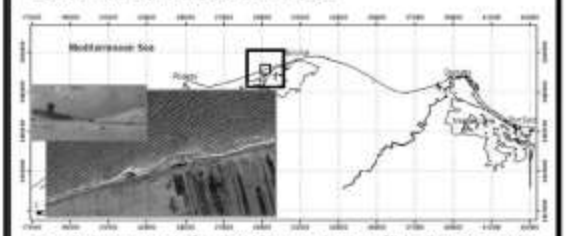
Rosetta breakwater constructed in 1990 on the two sides of Rosetta Head End to protect the Agriculture land behind it. The implementation of the breakwaters take place on land before the sea water reach the structure as a result of erosion process in the area

EAST ROSETTA GROINS



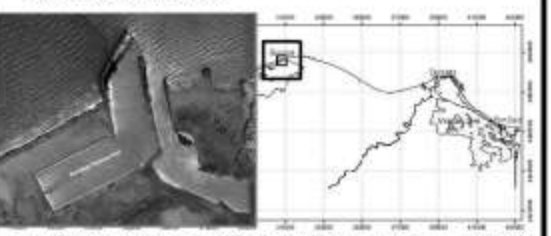
It is a set of 5 parallel groins located to the right of Rosetta eastern breakwater with about 900m distance in between. These groins constructed during 2001 to treat the erosion process which take place as a side effect of implementation of Rosetta western breakwater at the breakwater sides.

BURULLUS LAGOON SAND DUNE BAR



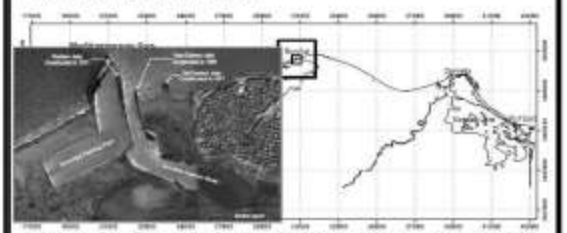
The Burullus lagoon is separated from the Mediterranean along most of its length by a long sand dune bar (about 30 km)

BURULLUS FISHING PORT



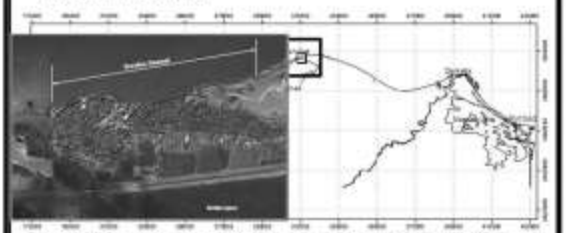
Burullus fishing port was constructed in 2002. It Consists of 4 Berths. The Maritime area occupies 22 feddans.

BURULLUS LAGOON STRAIT



Burullus Strait is the only junction between Burullus lagoon and Mediterranean Sea. The jetty on the western side of Burullus lagoon Strait was constructed around 1971. It extends about 120m into to sea. Later in 1982, eastern side jetty was constructed at a distance of about 280 m from the western one. But Due to sedimentation problem, the navigation channel of the strait reduced to 88m in 1990 so constructed a new jetty in the middle distance of the two jetties and filled the area between the two eastern jetties

BURULLUS SEAWALL

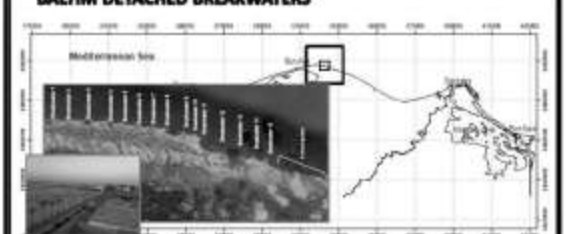


Burullus seawall was constructed in 1984 with width of 5m and level of + 2.5 m (above mean sea level). Geotextile polyester membrane was spread on the bed, fragments of basalt were filled above it and 1m3 concrete blocks were placed randomly against the seawall in order to disperse the action of waves. The Seawall length is about 2 km. erosion process is now taken place just after the eastern edge

SAND DUNES EAST BURULLUS WALL

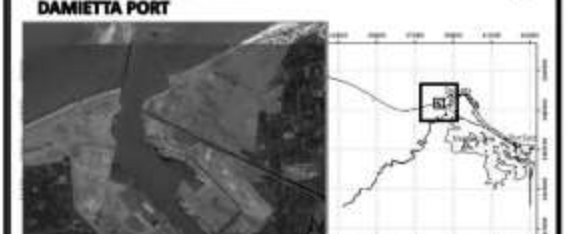
The Eastern side of Burullus seawall used to be protected naturally with sand dunes. But As a result of bulldozing sand dunes, the area exposed to erosion. A Structure of 3 detached breakwaters appear in the satellite image with the eastern one still under construction.

BALTIM DETACHED BREAKWATERS



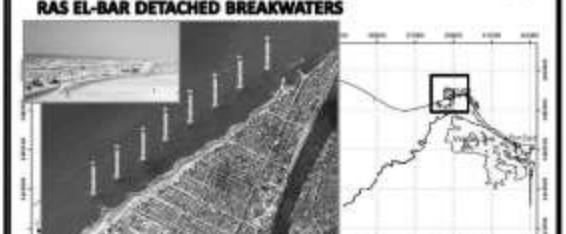
A system of four phases of detached breakwaters has been implemented since 1992 to protect Baltim resort village. The total length of protected cost is about 7 to 8 km. The number of segments in the whole system is fifteen detached breakwaters. The eastern side of the area is protected by a gravel revetment and 9 short groins

DAMIETTA PORT



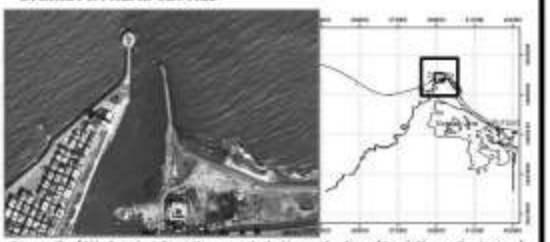
Dekheila port is a natural Port covers an cover an area of 2.5 km. It was Operated since 1986. The port Entrance banks are protected by two breakwaters. The western breakwater is 1840 m long (140 m in land and 1500 m in the sea). The Eastern breakwater is 738 long (200 m in land and 538 m in the sea). It Consists of 14 Berths.

RAS EL-BAR DETACHED BREAKWATERS



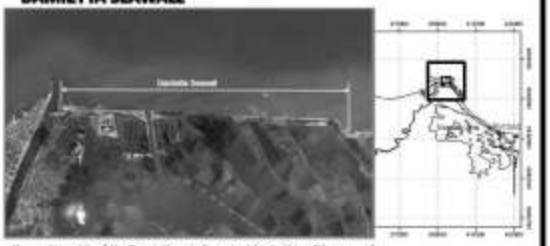
Eight detached breakwaters 200m in length with 200m spaces between it were constructed through the period from 1986 to 2010. The main function of this protection is to protect Ras El-Bar resort.

DAMIETTA HEAD JETTIES



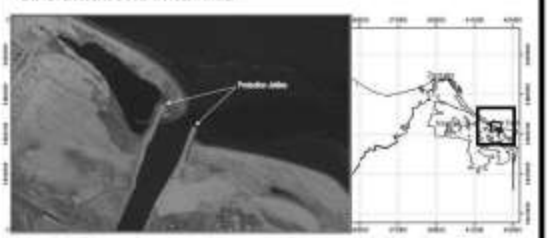
The mouth of Nile Branch at Damietta was protected by construction of two jetties on the banks of the mouth.

DAMIETTA SEAWALL



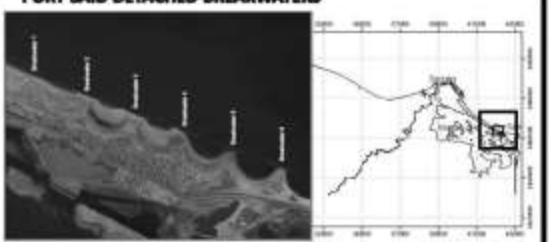
The eastern side of the Damietta mouth was protected by a 5Km seawall

EL-GAMAIL STRAIT JETTIES



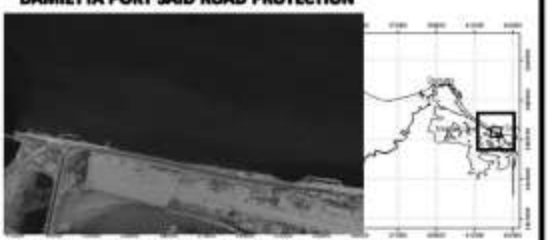
El-Gamail Strait is one of watercourse between Manzala lagoon and the Sea. It is protected by two jetties, one in each bank of the navigation channel. The Strait appear to suffer of sedimentation from the western side.

PORT SAID DETACHED BREAKWATERS



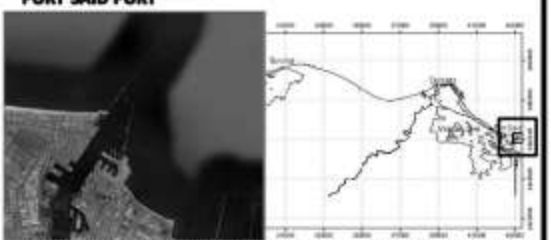
Six segments of detached breakwaters were constructed in 1997 on the eastern side of the El-Gamail outlet to protect the beaches from erosion and create swimming sandy beach.

DAMIETTA PORT SAID ROAD PROTECTION



is to strengthen and protect Damietta and Port Said Road along the 2.5 km

PORT SAID PORT



Port Said port is situated at the Northern entrance of the Suez Canal. Port Said Port was constructed in 1859. It Consists of 32 Berths (until June 2008). It has three parts Commercial Port, Military base and Fisheries port. The Entrance of the port(from north side is protected by breakwaters. The western breakwater is about 5.6 km long, and the eastern breakwater is about 2.4 km long.

Natural chain of coastal sand dunes and the international coastal road

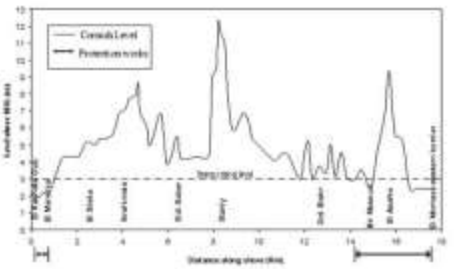
Sand Dunes at Middle Delta Coast and coastal protection works

Rosetta Sea Wall stopped the erosion and protected the backshore land Since its Construction

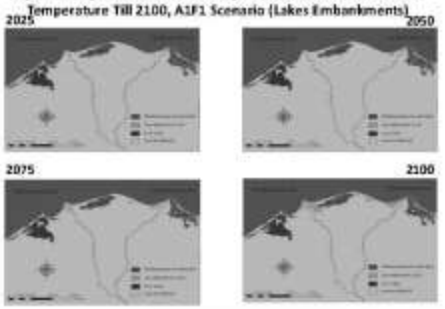
Muhammed Ali Sea Wall Protected Cultivated Low Lands (1.5m - 2.5m Below Sea Level)

Ras Al-Bar Resort Under Sea Attack Before the Construction of Protection Works

Ras Al-Bar Resort Has Gained Lands After the Construction of Protection Works

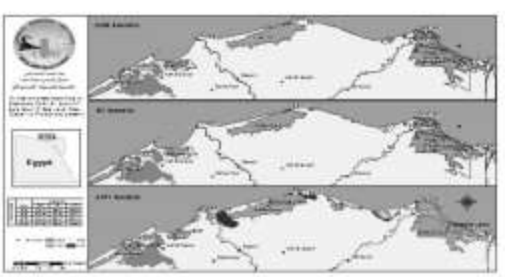


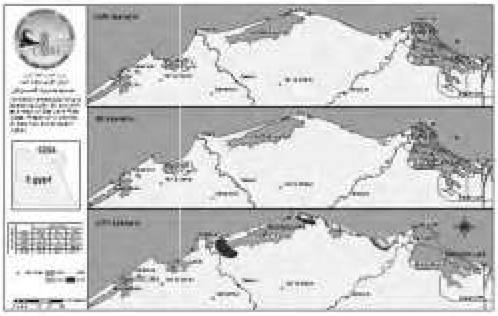
Expected Impact of SLR Due to Projected Values of The Mean Air Temperature Till 2100, A1F1 Scenario (Lakes Embankments)

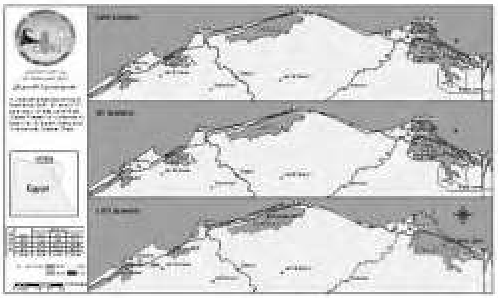


Total affected area and its percentage to the Nile Delta area (A1F1 scenario)

Year	2025	2050	2075	2100
Total Area Affected (km2)	152.86	256.27	450	761.4
Total % of the Nile Delta Area	0.61	1.03	1.8	3.01







Effect of Coastal Protection on decreasing vulnerability to climate change

Scenario	Year	No Protection	Protection %	[illegible]	Protection %	[illegible]	Protection %	[illegible]	Protection %
[illegible]	2025	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2050	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2075	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2100	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2025	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2050	[illegible]	0	41	[illegible]	41	[illegible]	[illegible]	[illegible]
[illegible]	2075	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2100	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2025	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2050	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2075	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2100	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

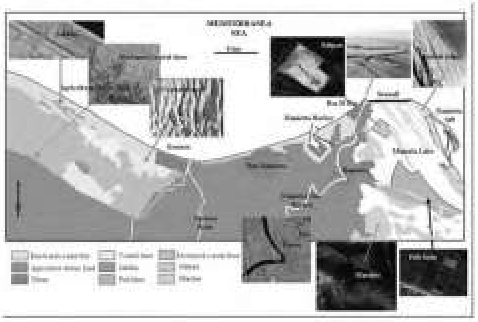
Adaptation to the Impacts of Sea Level Rise in the Nile Delta Coastal Zone, Egypt, 2009-2012

Funded by International Development Research Centre (IDRC)

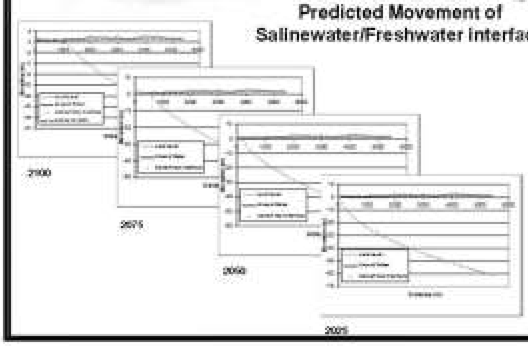
Main Objective

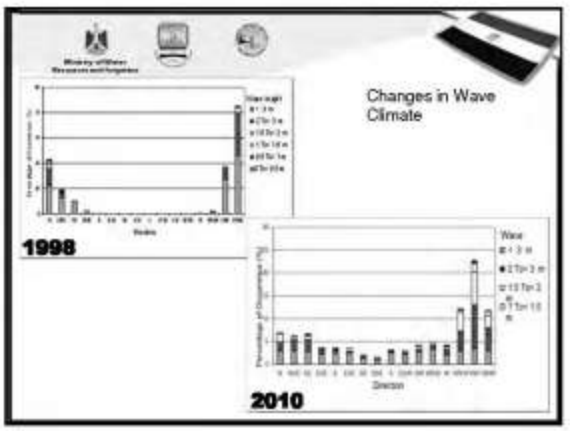
Research project addresses vulnerability assessment and adaptation options for potencial impact of SLR in coastal zone

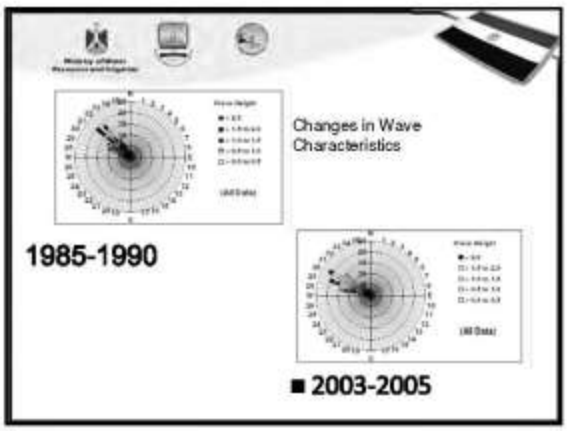
Case study application in Ras ElBar - Gammasa Region



Predicted Movement of Salinewater/Freshwater interface

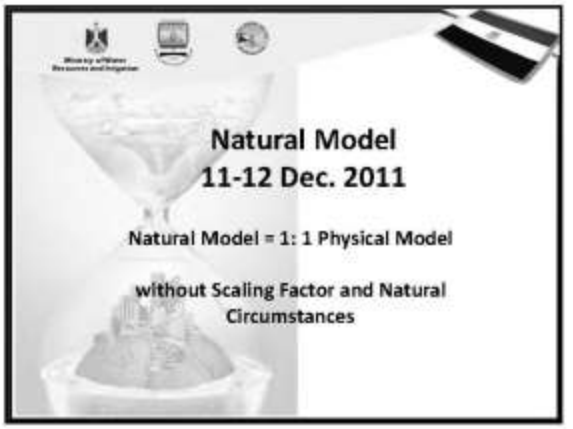






Changes in Wave Climate

Wave Climate	1998	2010
Significant wave height	0.94 m	1.31 m
Average wave height	0.5 m	0.76 m
Predominant wave direction	North NorthWest (NNW)	NorthWest (NW)
Average storm height	2.75 m	2.46 m
Total duration of storms	1.6 day/year	3.5 day/year
predominant storm direction	North	NorthWest




Ras El Bar


International Coastal Road


International Coastal Road


East Al-Burullus


Alexandria

- Sand dunes systems should be treated as the first defensive line for the Nile Delta.
- Decision makers in coastal governorates as well as concerned ministers should be aware of the importance of sand dunes systems and their role in protecting the coastal zone of the Nile Delta.
- Consideration should be paid to coastal lakes as one of the most appropriate adaptive measure against sea level rise.
- Coastal international road should be considered as the second protection measure and studies to support it are urgently required.
- Coastal protection constructions need regular maintenance and should be considered in any coastal zone management plans.
- The northwest coast extended from Alexandria to the Egyptian-Libyan borders is not vulnerable as it has elevation more than 10 m above average sea water level.

Recommendations

- Capacity building in terms of staff, technologies, modeling, ...etc.
- Preparation of integrated coastal zone management scheme
- Research budget and funds should be increased to cope with the national and international crisis regarding climate change and its impacts and adaptation studies.
- Building co-operative mechanism to integrate all efforts
- Awareness program and media campaign
- Regional monitoring and observation system
- Regional data base and knowledge exchange system
- Regular Maintenance program for protection structures
- The following aspects are recommended to be covered in further studies for the coastal zones:
  - Potential impacts on land and groundwater salinity
  - Potential impacts on patterns of waves and currents
  - Potential impacts on erosion and accretion systems due to currents, waves, and wind actions
  - Potential impacts on lakes ecosystems
  - Potential impacts on water resources and drainage systems
  - Potential impacts on fisheries due to changes expected in current patterns
  - Potential impacts on infrastructures and natural resources of the coastal zone of the Nile Delta
  - Potential impacts of climate changes on evaporation from oceans and seas open waters and their role in reducing SLR
  - Potential impacts of temperature increase on phyto-plankton role in absorbing CO2 and generating O2.

Thank You All

وحيد سعودى
مدير عام التحاليل والتنبؤات الجوية
والمتحدث الرسمى للهيئة العامة للأرصاد الجوية

مقدم ومعد النشرات الجوية للإذاعة
والتليفزيون المصرى
seoudiwaheed@yahoo.com

أولا : تعريف مبسط للأعاصير

- هي عبارة عن عواصف (حركات هوائية) حلزونية , تنشأ في العادة فوق البحار أو المحيطات الإستوائية وتتجه نحو اليابسة مسببة الدمار لكل ما يعترض طريقها وتستمر لعدة أيام وفي الغالب يكون أشد الدمار على الشواطئ.

كيفية تكون الأعاصير

- عندما يسخن الماء في البحار الإستوائية الي درجة حرارة تتراوح بين **27** إلى **28** درجة مئوية فإنه يعمل علي تسخين طبقة الهواء الملاصقة له, ويتسخينها يخف ضغط الهواء فيتمدد ويرتفع الي أعلي ويكون منطقة ضغط منخفض تنجذب اليها الرياح من مناطق الضغط المرتفع المحيطة فتهب عليها من كل اتجاه مما يؤدي الي تبخر الماء بكثرة وارتفاع هذا البخار الخفيف الي أعلي وسط الهواء البارد.

إحصائيات لبعض الأعاصير

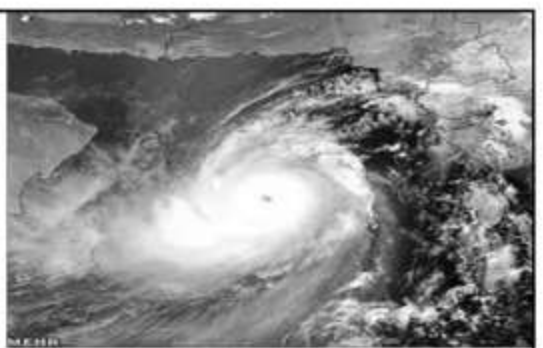
أقوى إعصار حلزوني: إعصار "تاسي" في شمال غرب المحيط الهادي في الثاني عشر من سبتمبر عام **1961**، والذي بلغت سرعة رياحه **342** كيلومتر/الساعة.

- *أسرع الأعاصير الحلزونية تكونا*: إعصار "أوريست" في شمال غرب المحيط الهادي في شهر سبتمبر **1983**، راحت سرعة رياحه 56 كم/الساعة في خلال **6** ساعات، وبعدئذ إلى **138** كم/الساعة في خلال يوم واحد.
- *أعلى موجة ناتجة عن إعصار حلزوني*: موجة كان ارتفاعها **13** مترا في إعصار "بكرست باي" بأستراليا عام **1899**.
- *أضخم إعصار حلزوني*: إعصار "تيب" في شمال غرب المحيط الهادي في أكتوبر **1979**، والذي بلغ قطره **1100** كم.

أصغر إعصار حلزوني: إعصار "تريسي" بأستراليا في ديسمبر **1974**، والذي بلغ نصف قطره **50** كيلومترا فقط.

أطول إعصار عمرا: إعصار "جون" في شهري أغسطس وسبتمبر من عام **1994**، والذي استمر لمدة **31** يوم.

- *أكثر الأعاصير تسببا في وفيات*: إعصار بنجلادش عام **1970**، والذي تسبب حسب أقل التقديرات في وفاة أكثر من**300.000** مواطن.
- *أكثر الأعاصير دمارا*: إعصار "أندرو" عام **1992**، والذي أصاب جزر "الباهاما"، وولايتي "فلوريدا" و "لويزيانا" الأمريكيتين، والذي قدرت خسائره بـ**26.5** بليون دولار أمريكي.



مثال لإعصار استوائى

•وجدير بالذكر بأنه في بعض الحالات النادرة يصاحبها ما يعرف باسم التورنادو (النكباء) التي ضربت الولايات المتحدة ونتج عنها دمار هائل وهي تسمى احيانا بالاعاصير القمعية.

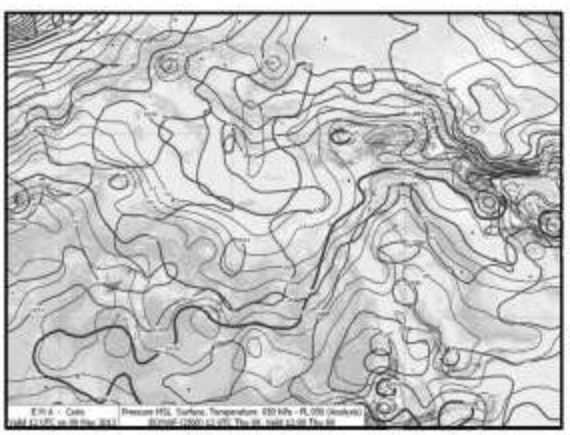
كيفية تكون التورنادو
TORNADO

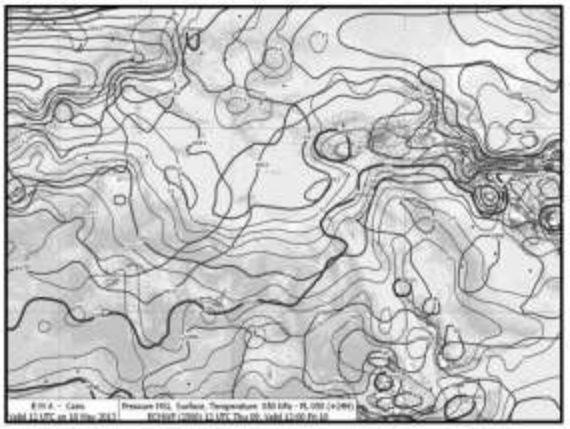
- يعتبر إعصار التورنادو من أكثر العواصف الجوية تدميرا، فالمنطقة التي يمر عليها تبدو و كأنه قد حدث بها زلزال عنيف
- ترجع الطاقة الهائلة للتورنادو و السرعة المدمرة للرياح التي ترافقه إلى صغر مساحته و شدة الانخفاض المفاجئ للضغط الجوي , فأغلب أعاصير التورنادو لا يزيد قطرها عن 2 كيلو متر كما يتناقص الضغط الجوي فيها إلى 800 او 600 ملليبار داخلة ليكون قيمة الفرق في الضغط الجوى ما بين داخلة وخارجة حوالى من 250 إلى 450 ملليبار و تصل سرعة الرياح المصاحبة له إلى 500كم / ساعة .

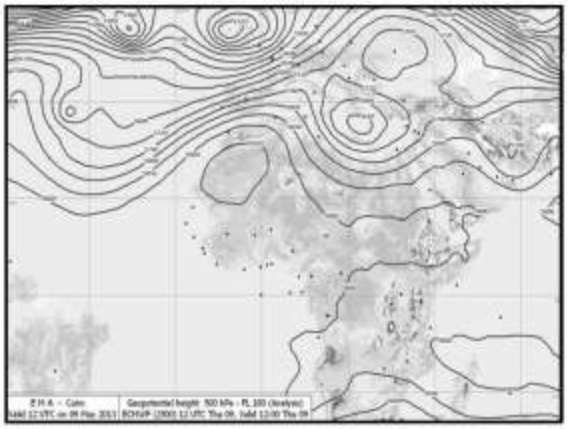
التورنادو يظهر كقمع متدلى من سحب المزن الركامي

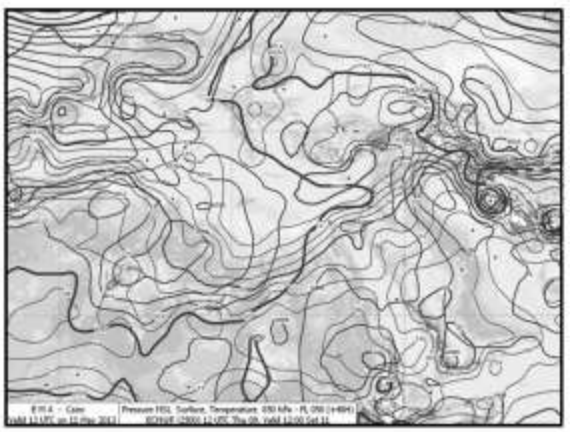
•دراسة تفصيلية لما حدث فى جمصة يوم 10 -5-2013

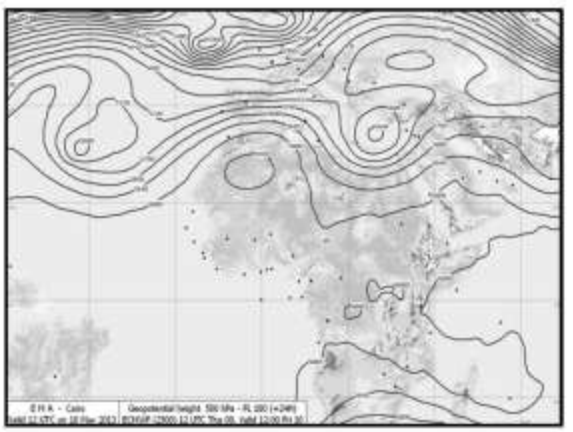
• الخرائط السطحية والعلوية قبل واثناء اعصار جمصة

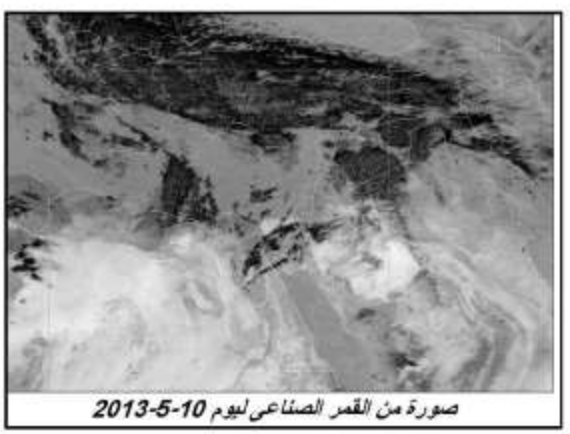




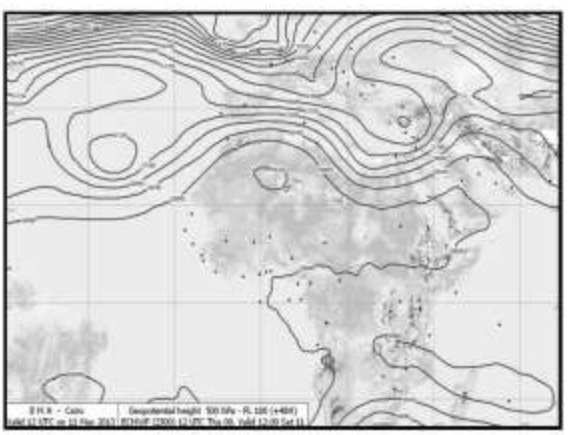








صورة من القمر الصناعي ليوم 10-5-2013



تفسير الحالة

- تأثرت محافظات ومدن شمال البلاد ومنها منطقة جمصة بمحافظة الدقهلية بوجود منخفض جوي سطحي كان مصحوبا برياح جنوبية شرقية مرتفعة في درجة حرارتها ومحملة بنسبة عالية من بخار الماء ونظرا لوجود منخفض جوي اخر في طبقات الجو العليا مصحوب بتيار نفاث شديد البرودة مما ادى إلى حالة عدم استقرار شديد في الاحوال الجوية
- تكونت السحب الركامية الرعدية صاحبها سقوط الامطار الغزيرة والبرد وهذه السحب يصاحبها تيارات هوائية صاعدة واخرى هابطة ينتج عنها رياح ذات سرعات عالية جدا تتجاوز ال 50 عقدة اي حوالي 90 كم/ساعة تقريبا , هذه الرياح عنيفة ومدمرة للمباني والاسقف والاعمدة الكهربائية وهذا ما حدث بالفعل على منطقة

دور الهيئة العامة للارصاد الجوية قبل حدوث الطقس الغير مستقر على جمصة

- اصدرت الهيئة العامة للارصاد الجوية تحذير جوي لكافة قطاعات الدولة بما فيها وسائل الاعلام صباح يوم الخميس الموافق 09-5-2013 تأكيدا للنشرات الجوية الصادرة والسابقة لهذا التحذير وعلى الاقل لمدة 72 ساعة وقد تم التحذير من سوء الاحوال الجوية على المدن الساحلية وبعض محافظات الوجه البحري وشمال سيناء.

●التحذيرات والنشرات ليوم 10-5-2013

جدول الاربعة ايام ليوم 10-5-2013

النشرة الجوية ليوم 10-5-2013

التحذير الجوى ليوم 10-5-2013

●بيان بحالة الطقس على جمهورية مصر العربية

- يتوقع خبراء الأرصاد الجوية أن تتعرض مدن ومحافظات السواحل الشمالية وشمال سيناء لحالة من حالات عدم الأستقرار فى الأحوال الجوية
- فيها تتكاثر السحب الممطرة والرعدية ونشاط للرياح المثيرة للرمال والأتربة تصل لحد العواصف على هذه المناطق وذلك إعتبارا من يوم الغد الجمعة الموافق 10/05/2013 مما يؤدى بدورة إلى إنخفاض الرؤية على الطرق لأقل من 1000 متر وقد تصل كميات الأمطار لحد السيول على سيناء ...لذا تهيب الهيئة بالسادة المسئولين عن هذه المناطق إتخاذ التدابير اللازمة للحد من الآثار الناجمة عن سوء الأحوال الجوية.

- ويمكن الأتصال بالهيئة على مدار ال 24 ساعة للأستفسار عن الأحوال الجوية على التليفونات الأتية 26849859 – 26842473

- تم إرسال هذا البيان الجوى لجميع وسائل الأعلام المرئية والمسموعة والمقروءه يوم الخميس الموافق 09/05/2013 تأكيدا لنص النشرات السابقة.

فى النهاية يمكن وصف حالة عدم الأستقرار فى الأحوال الجوية التى أثرت على منطقة جمصة بمحافظة الدقهلية يوم الجمعة الموافق 10/05/2013 كانت عبارة عن إعصار قمعى لايزيد نصف قطره عن 500 متر وبلغت سرعة الرياح فيه لحوالى 55 عقدة تقريبا 100 كم/ساعة وذلك من خلال خرائط توزيعات الضغط السطحية وطبقات الجو العليا ومن خلال أيضا صور الأقمار الصناعية .

أهم التوصـــــيات

1- إذاعة النشرة الجوية على الأقل بمعدل ثلاثة مرات يوميا.
2- بقدر الأمكان إذاعة النشرات الجوية من قبل السادة الأخصائيين الجويين المتخصصين نظرا لقدرتهم على توصيل المعلومة.
3- تكون هناك خطوط ساخنة بين الهيئة العامة للأرصاد الجوية ووكالة أنباء الشرق الأوسط بهدف نشر التحذيرات الجوية بأسرع مايمكن من خلال وسائل الأعلام المقروءه والمسموعة والمرئية .
4- تشكيل لجنة أزمات مشتملة من أعضاء من هيئة الأرصاد الجوية – قطاع الأخبار بالاتحاد الإذاعة والتلفزيون – وزارة الداخلية – وزارة الدفاع – وزارة الرى ...على أن يمكن إضافة أى أعضاء أخرين متخصصين فى هذا الخصوص.
5- إعادة بناء المخرات فى الأماكن المناسبة فى المناطق المعنية بسقوط الأمطار الغزيرة بها والتى تصل فيها أحيانا كميات الأمطار لحد السيول

شكرا لحضراتكم

Water Resources Management Programme

Alexandria 2030 IUWM Strategic Plan

Khaled AbuZeid, Ph.D, PE, PMP, CEDARE
Mohamed Elrawady, MSc, CEDARE
Tamer ElHakim, BSc, CEDARE

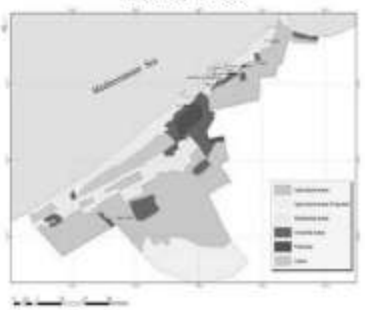
Water Resources Management Programme

Introduction

- 4 Million Inhabitants (2011)
- Alexandria accounts for about 5.5% of Egypt's Population and for almost 8% of the country's GDP.
- It embraces a coast line of 70 kilometers and is home to 40% of Egypt's industrial establishments
- The Nile River supplies over 95% of Alexandria's water demand
- The city receives rainfall of less than 200 mm/year

Water Resources Management Programme

Land Use



Water Resources Management Programme

Strategic Planning in a Nutshell (1)

- Ten studies were prepared, covering the base for the strategic planning team to develop a plan for the year 2030; eight of them are directly related to water supplying/saving options. The studies are:
  a. Groundwater Potential
  b. Stormwater potential
  c. Water Demand Management Potential
  d. Waste Water Reuse Potential
  e. Agricultural Drainage Reuse Potential
  f. Sea Water Desalination Potential
  g. Urban Water Reuse Potential
  h. Nile Water Availability
  i. Climate Change Impact
  j. Financial Sustainability and affordability assessment

Water Resources Management Programme

Strategic Planning in a Nutshell (2)

- Data were collected for the city water resources covering the history of the water system in Alexandria, describing the current and future water demand as well as the activities and responsibilities of different stakeholders including Ministry of Water Resources and Irrigation (MWRI), Alexandria Water Company (AWCO), Alexandria Sanitary Drainage Company (ASDCO), and other institutions involved in water management.
- A vision for water demand management in the City of Alexandria was developed and formulated by the Learning Alliance (LA).

Water Resources Management Programme

Strategic Planning in a Nutshell (3)

- Possible scenarios for the anticipated future water system in Alexandria City were described.
- The potential amounts of water that may be made available by eight strategic options to satisfy future water demand were studied.
- The strategies were evaluated, costed, and ranked.

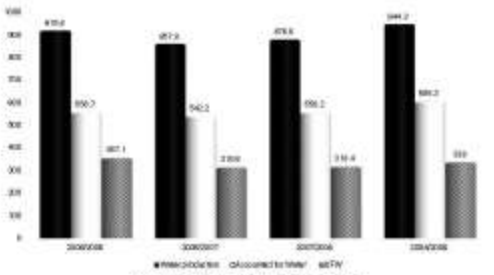
Water Resources Management Programme

Baseline 2011: Nile Water Allocations

Irrigation Directorate	Canal	Surface Area (in Feddans)	Agricultural Demand (MCM/day)		Industrial Demand (MCM/day)	Navigation Demand (MCM/day)	Drinking Demand (MCM/day)
			Maximum (at peak month) (MCM/day)	Average (at peak month) (MCM/day)			
			13 MCM/day				

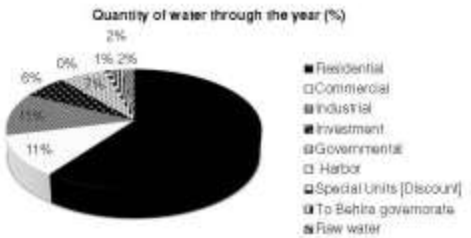
Water Resources Management Programme

Baseline 2005-2009: Water Supply



Water Resources Management Programme

Baseline 2011: Water Consumption



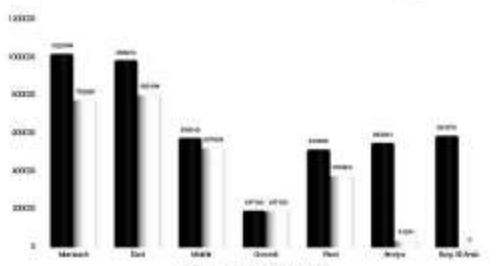
Water Resources Management Programme

Baseline 2011: Sanitation

- The total length of the sewerage systems is about 750 km of various diameters ranging from 200 mm to 2750 mm
- The existing annual wastewater treatment capacity is 395 MCM
- Existing wastewater treatment plants receive the collected wastewater through 80 pump stations of different capacities

Water Resources Management Programme

Baseline 2011: Sanitation (2)



Water Resources Management Programme

The 2030 Alexandria Water Vision

' We envisage a city where available water resources are managed in an integrated manner, with the participation of all citizens, and are used effectively for development within a framework of environmental sustainability, where all citizens have access to high quality (according to national standards), reliable, sustainable, and affordable water and sanitation services and benefit from a clean and healthy environment'

SWITCH Learning Alliance, 2007

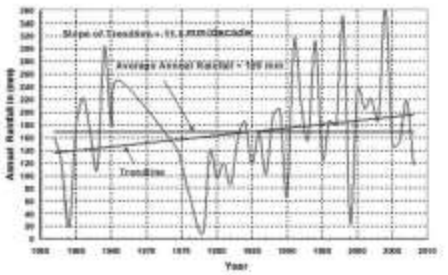
Water Resources Management Programme

Strategic Options: Groundwater Potential

No.	Aquifer	No.of Wells	Present Extraction m^3/year
1	Coastal Aquifer	373	1,573,590
2	Nile Delta Aquifer	190	2,702,830
3	Ralat aquifer	752	26,808,830
	Total	1315	31,085,250

Water Resources Management Programme

Strategic Options: Storm Water Potential



Water Resources Management Programme

Strategic Options: Water Demand Management Potential

- It was proven that 20 MCM could be made available annually by minimizing physical and commercial losses from pipe network.
- Increasing the drinking water tariff gradually could save 60 MCM annually starting from 2030; this amount corresponds to the value of monetary savings resulting from an average tariff increase of 5%.
- Maximizing household water use efficiency is estimated to save 44 MCM annually.

Water Resources Management Programme

Strategic Options: Wastewater Reuse Potential (900 MCM/yr)

Water Resources Management Programme

Strategic Options: Agricultural Drainage Reuse Potential

Water Resources Management Programme

Strategic Options: Sea Water Desalination Potential

- It has been shown that if sufficient funds are available, the maximum amount of desalinated water could reach up to 777 MCM annually starting from 2030, based on the needs of some particular coastal areas. The locations where the desalinated water can be used have also been determined. Moreover, a desalination system that could produce up to 2.13 MCM of desalinated water daily has been proposed, 366 units of the proposed system will be needed to produce the above mentioned daily amount.

Water Resources Management Programme

Strategic Options: Urban Water Reuse Potential

- Three strategic alternatives have been assessed, these are Grey water reuse, roof water reuse, and road water reuse, the Aquacycle model has showed that these options could introduce 23, 14, and 25 MCM annually to the Alexandria water budget respectively.

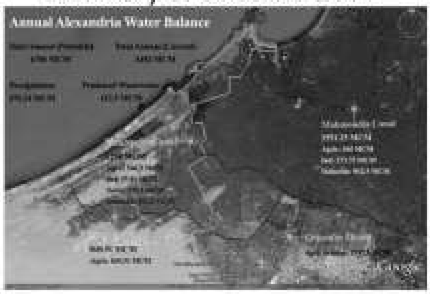
Water Resources Management Programme

2030 DEMAND

CURRENT SITUATION			2030		
Year 2010			[illegible]		
Total Water Produced		[illegible]	[illegible]		
Total Water Sold		[illegible]	[illegible]		
Population		[illegible]	[illegible]		
Category	Consumption %	Consumption LPCD	Consumption %	Consumption LPCD	[illegible]
Domestic	61.16	218	61.16	218	[illegible]
Industrial	11.2	40	11.2	40	[illegible]
Commercial	11.71	42	11.71	42	[illegible]
Investment	6.51	23	6.51	23	[illegible]
Governmental	6.73	24	6.73	24	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UFW %	[illegible]		[illegible]		
UFW		[illegible]		[illegible]	[illegible]
[illegible]		[illegible]		[illegible]	[illegible]

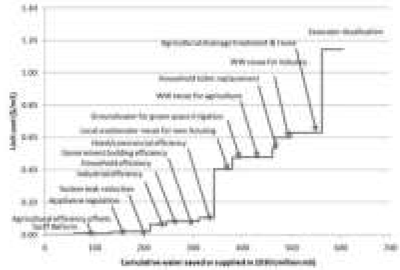
Water Resources Management Programme

Summary of Baseline 2011



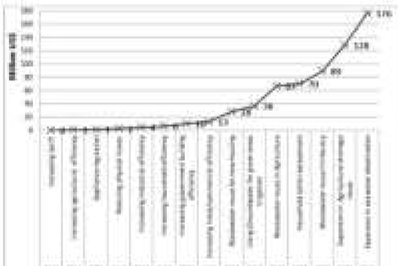
Water Resources Management Programme

Meeting Multiple Objectives



Water Resources Management Programme

IUWM Plan Timeline



Water Resources Management Programme

Thank you for your attention

وزارة الدولة لشئون البيئة

جمهورية مصر العربية

Vulnerability & Adaptation to Climate Change in Egypt

Prepared by

Dr. Mohamed Ismail Ibrahim

Vulnerability & Adaptation Management General Director

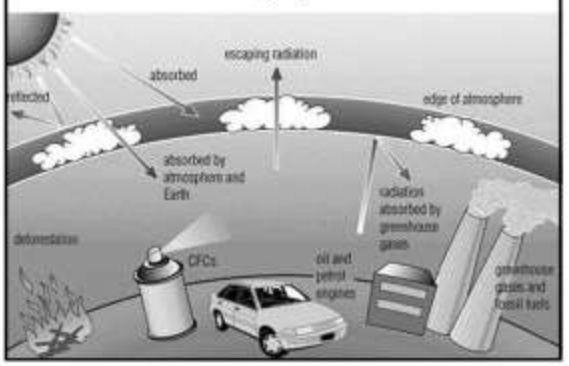
Content

- Climate change phenomenon
- Vulnerability of Egypt to climate change
- Adaptation to climate change

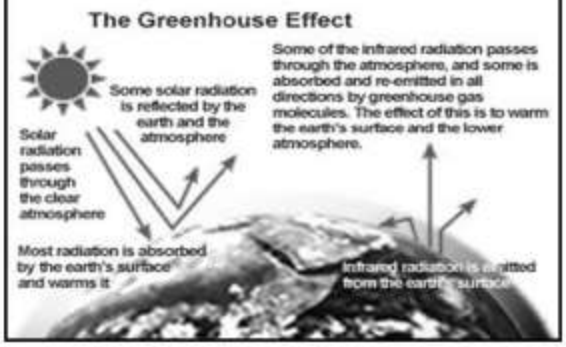
introduction

Egypt's large and dense packed population makes the country extremely vulnerable to climate change. Egypt does not produce enough food to feed its current population. Its water resources also are rather limited. Moreover, The studies have indicated that the following areas are the most vulnerable in order of severity and certainty of results: agriculture, coastal zones, aqua-culture and fisheries, water resources, human habitat and settlements, and human health.

Climate change phenomenon

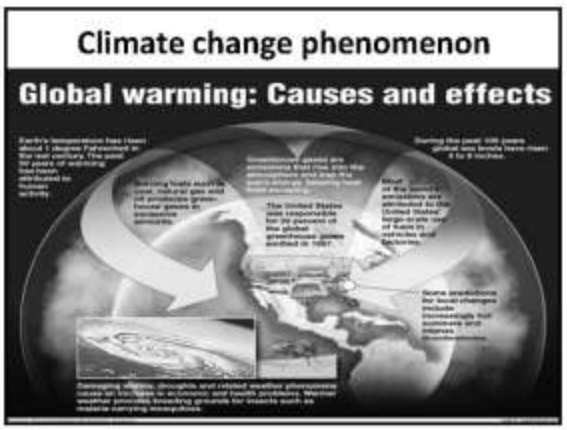


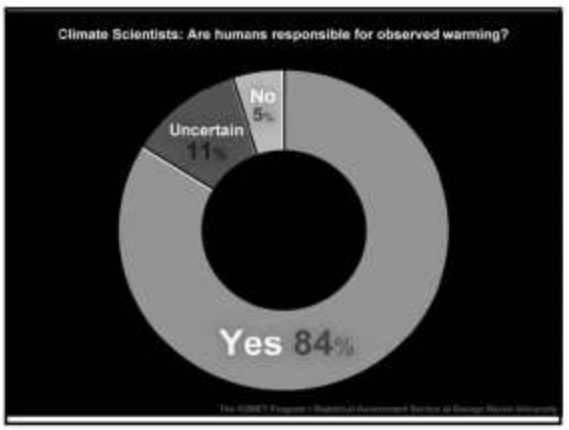
Climate change phenomenon



Climate change phenomenon

Climate change phenomenon





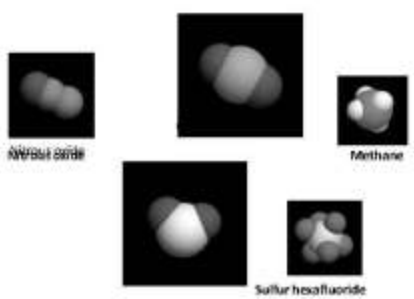
Greenhouse Gasses GHG

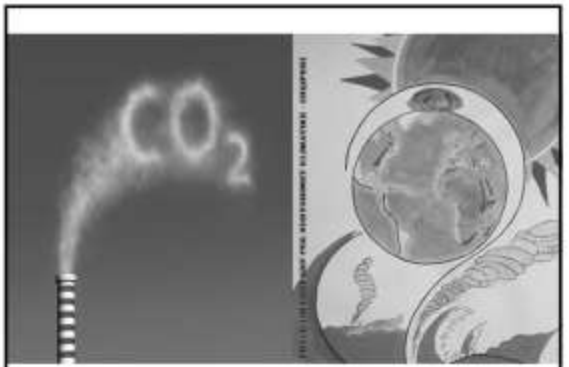
- Its gases have the unique property as absorb part of the infrared reflected by the surface of the Earth and contribute thereby to heat the planet's surface in the same way that heats the greenhouses used in the field of agriculture, and some greenhouse gases present naturally in the atmosphere, such as water vapor, carbon dioxide and methane, is that human activities such as the use of oil fuel and coal and the uprooting of trees contributed to an increase in the concentration of these gases in the atmosphere and is what has contributed and is still in the strengthening of global warming and therefore high rates of temperature on the surface of the earth.

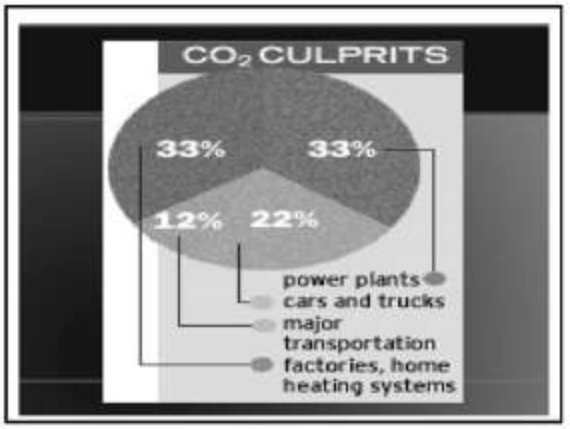
Greenhouse Gasses GHG

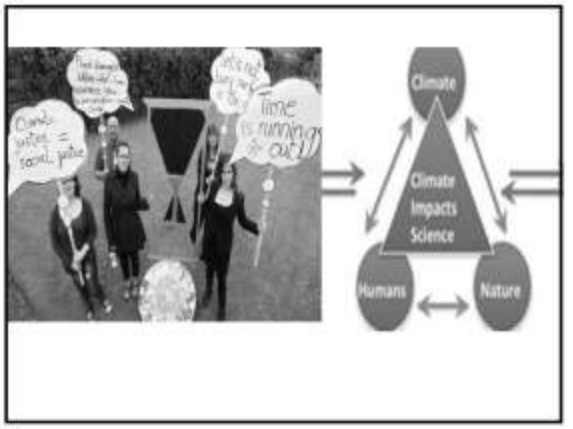
- Greenhouse effect is a phenomenon confined atmosphere, some of the sun's energy to heat the earth and maintain a moderate climate.
- Carbon dioxide is one of the main gases that contribute to the doubling of this phenomenon is produced during the burning of coal, oil and natural gas in power plants, cars and factories, etc., in addition to deforestation widely.
- Other greenhouse gases that affect are:
  Methane from rice farms, cattle breeding, waste landfills, occupancy mines and gas pipelines.
- CFCs (Chlorofluorocarbons) responsible for the erosion of the ozone layer.
- Nitrogen oxides.

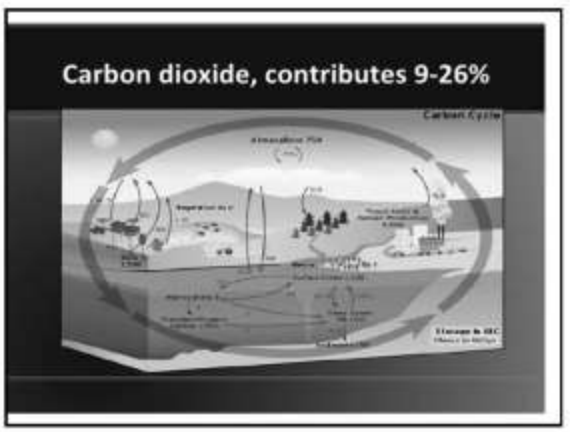
Greenhouse gases

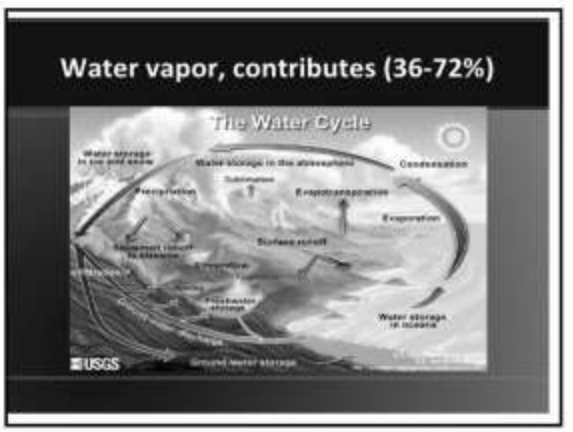


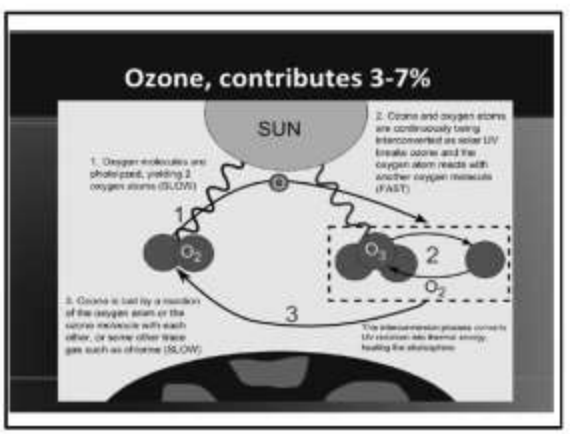


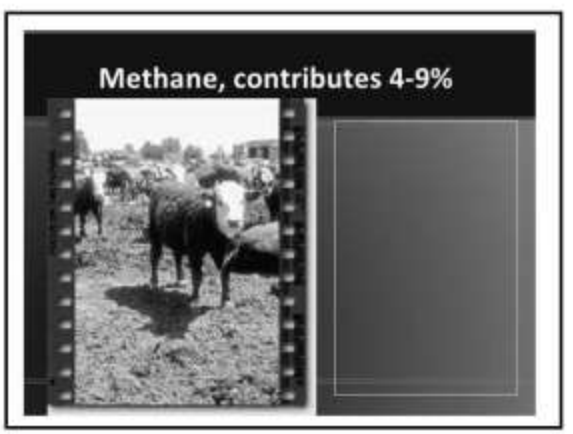

CO_2 CULPRITS
33%
33%
12%
22%
power plants
cars and trucks
major transportation
factories, home heating systems

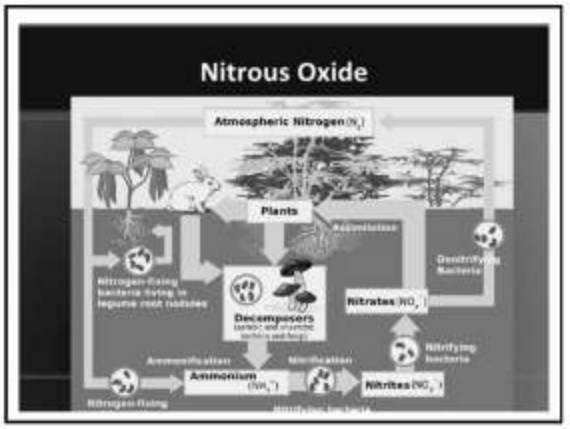

Climate
Climate Impacts Science
Humans
Nature

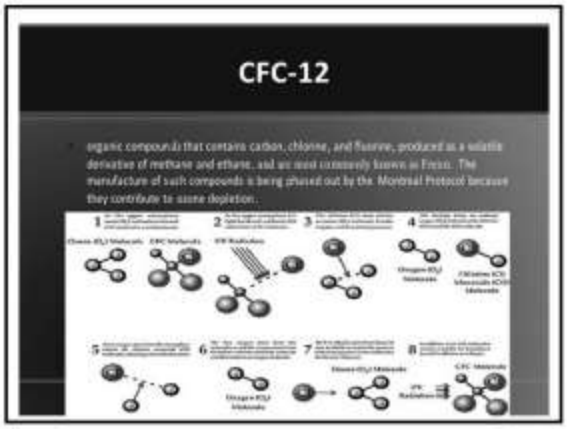

Carbon dioxide, contributes 9-26%
Carbon Cycle


Water vapor, contributes (36-72%)
The Water Cycle
USGS


Ozone, contributes 3-7%
SUN
1
2
3
O_2
O_3
O_2

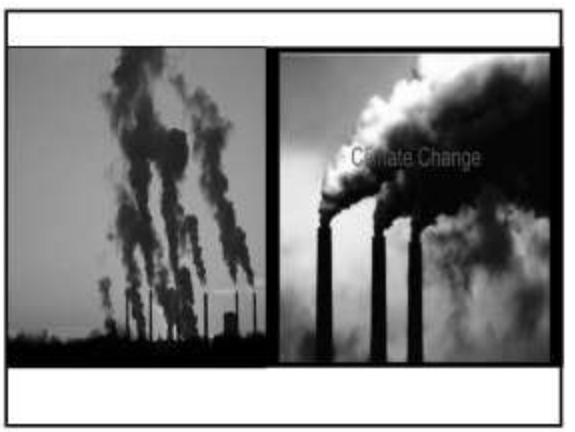

Methane, contributes 4-9%





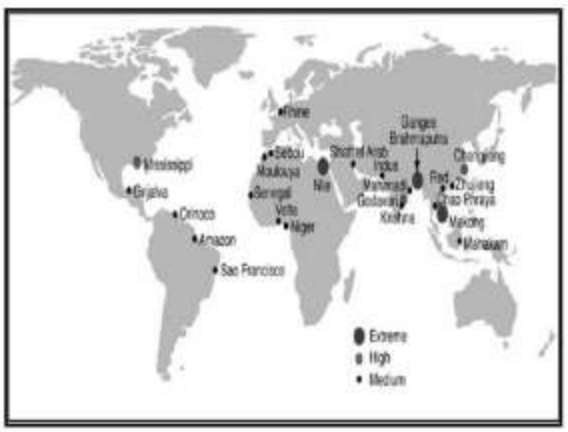
Human role in strengthening the global warming

- Many theories since the mid-nineteenth century Showed that certain gases to the atmosphere of the Earth like carbon dioxide, methane and nitrous oxide duo trap heat and contribute to the heating of the earth At the beginning of the twentieth century gave Swedish scientist Arrhenius idea that emissions of greenhouse gases in the atmosphere would lead to higher temperatures and thus climate change on the planet if Although the idea of the impact of humans on the Earth's temperature occurred a hundred years ago almost, but scientists did not they could only confirm this phenomenon since a relatively short period .
- Scientists confirm that humanitarian activities and since the Industrial Revolution Horn of nineteenth-contributed and are still in the strengthening of global warming through the secretion of large amounts of greenhouse gas atmosphere such as carbon dioxide resulting from the burning of fossil fuels such as coal shale oil to generate the energy needed by the human development.



CO_2, CO_2, San k Gnawa?

Vulnerabilities



Melting ice due to climate change

- The high average temperature of the earth's atmosphere lead to the melting of the ice, whether at the poles or in the higher mountains or in Oceans North and South.
- Melting ice lead to increase the proportion of solar radiation absorbed from the Earth's surface, so that the glaciers reflect 80-85% of the amount of solar radiation incident on and so will accelerate the increase of atmospheric temperature.

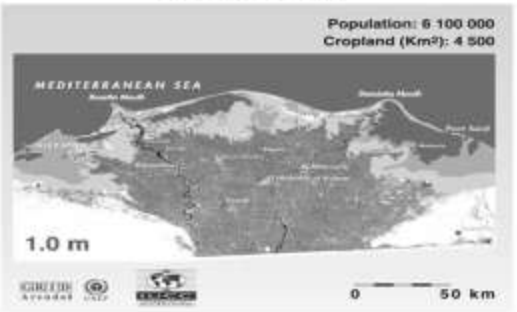
What to expect ... As a result of climate change??!!

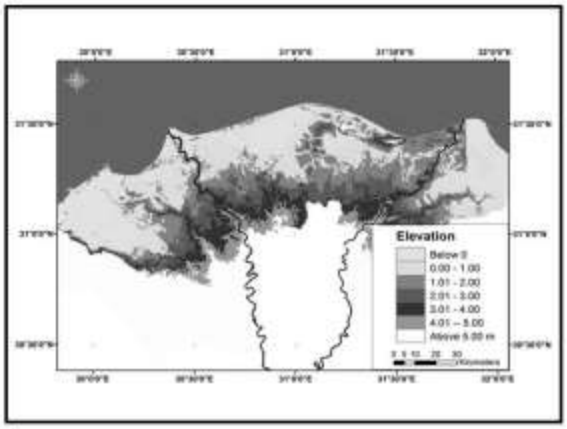
Ice Breaker (for all of us)

Sea Level Rise

- The temperature increased over the past 100 years is about 0.7 ° C and believed that the sea level has risen between 10 - 15 centimeters.
  The figures which were accepted by the participants in the climate change conference probability of high temperatures between 1.4 - 4.5 degrees Celsius over the next hundred years, and sea-level rise between 20 - 140

Some coastal low lying land could be inundated in the Nile Delta.





Inundated area

Governorate	Inundated area %		
	A1FI (59 cm)	Rahmstorf (50 – 140 cm)	Pfeffer (80 – 200 cm)
Al Dakahliya	15.74	36.95	47.01
Al Behairah	18.72	29.34	33.32
Alexandria	23.75	25.91	26.69
Damietta	32.65	71.76	94.79
Kafr Al Sheikh	27.08	57.27	67.81
Port Said	38.86	61.95	74.75

Inundation by land subsidence

Governorate	% of Governorate area
Al Dakahliya	12.44
Al Behairah	12.90
Alexandria	21.41
Damietta	29.74
Kafr Al Sheikh	17.19
Port Said	17.08

What to expect ... As a result of climate change??!!

- Although it is difficult to predict the effects of high temperature and sea level rise in the specific area, but there are many expectations:
  Flooding large areas of the coastal plains, which is considered one of the best agricultural land in the world.
- Floods for some cities as some islands may disappear, and in some cases, small island developing States and forever.
- Vulnerable the coastal installations (Coastal Constructions) such as bridges, water barriers and Utilities also will increase the erosion of beaches.
- Saltwater intrusion (Saline Water Intrusion) to aquifers (Aquifers) and scarcity of water resources. Will increase the number of people who suffer from a shortage of drinking water within 50 years from 5 billion to 8 billion people.
- The difficulty of agriculture in arid regions and increase the high temperatures of the demands on irrigation.

What we expect also?

- Reduction in agricultural crop and thus shrinking food stocks.
- Eliminate a lot of Forests .
- You'll also find some species they are in an environment where the environment not having enough time to adjust.
- Declining soil fertility and worsening as the erosion change citizen of plants and increased drought and changing rainfall patterns will lead to the exacerbation of desertification.
- A lot of disorder ecosystems (Ecosystems) and Biodiversity. Spread of pests (Pests) and disease-carrying insects(Mosquitoes) that transmit malaria.
- The accelerating frequency of climatic disasters such as high droughts, floods, storms and other than harms communities and their economies.

Drought.

Where the Climate Change More Affect ?

- The developing countries more vulnerable to climate change than the rich countries (Developed Countries), where the poor people in poor countries are the ones who will be exposed to greater risks due to increased volatility and sudden climatic patterns (such as floods, droughts, and do not have the ability to confront).

Adaptation

Proposals for combating climate change

- Logical solution optimized to address climate change is to stop emissions significantly (solution includes matters related to the global economy).
- The text of the Kyoto Protocol (1997) on the general principles to stop emissions of greenhouse gases. At a meeting in Bonn, 23/7/2001, approved more than 180 countries of the Kyoto Protocol and made him a legal treaty, but the United States pulled out of the climate negotiations and did not sign the Kyoto Protocol in Bonn meeting, and the United States has produced more than a quarter of contamination world carbon dioxide.
- Forestry and changing agricultural practices.
- Guided by the use of traditional energy sources.
- Reduce dependence on fossil fuels as the primary source of energy and seek forward to providing clean energy sources (renewable energy production from wind, water and sun).
- Recycling & walking and the use of mass transportation and reduce consumption (Turning Down) and lights-out time of departure (Switching Off) and change behaviors.

Preventive measures

- First: To reduce the risk of flooding and reduce the pace of this matter requires speed to take the necessary measures to control high groundwater levels are as follows:
  immediately stop of domestic exchange in groundwater in all the villages of the provinces of the Delta and the work covered drainage systems to reduce groundwater levels and all coastal cities.
  Reduce leaching rates of irrigation water to groundwater through the use of modern irrigation methods alternative to flood irrigation methods or a few crops farming water consumption with improve networks of agricultural drainage.
  Expansion in groundwater use the alternative to surface water in irrigation operations.
  The use of groundwater to irrigate landscaping Channel and Delta cities.
  Water re-use and recycling to reduce waste and reduce its negative effects.

Preventive measures

- The expansion in the construction of waves walls along our coasts especially in North low of them and in front of the watercourses and the Nile Delta will not be with the effectiveness meaningful protection from flooding coastal areas unless it is to control the continuing rise in groundwater levels to those areas which may increase the problem complex to include flooding the coastline groundwater.

First Of All

Realize that THERE IS CLIMATE CHANGE.

Wag kayong in denial. :D

SECOND

Personal Efforts

- At home
- At school
- At work

Turn off lights and other appliances

Lesser aircon

Walk instead of drive

THIRD

Nation wide effort

Urban Planning

Garbage management

FOURTH

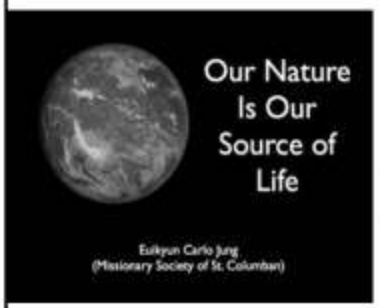
Global Effort

Alternative Fuels

Co2 reduction

World Peace :>

This Our Life



Thank You

Building Climate Resilience in The Nile Delta

Egyptian Delta Alliance Wing

Ibrahim Elshinnawy

Director of Coastal Research Institute (CoRI)
National Water Research Center (NWRC)
Ministry of Water Resources & Irrigation (MWRI)

What is the Delta Alliance?

- Delta Alliance is an international knowledge-driven network organization with the mission of improving the resilience of the world's deltas.
- Delta Alliance brings people together who live and work in deltas. They can benefit from each other's experience and expertise in order to contribute to an increased resilience of their delta region.

Why Delta Alliance?

- The experiences and research from across river deltas must be shared, and collaborative research must be undertaken to support delta regions in responding quickly and effectively to their mounting challenges.
- Solutions for the complex problems faced in river delta regions will not be found in one discipline alone, but in combining the knowledge of both hard and social sciences.
- Integration of knowledge across disciplines, sectors, and regions will yield new and critical insights into how best to improve the overall resiliency of river delta regions worldwide.

Idea

- In spring 2010, Delta Alliance conducted a survey among its members to explore their expectations of an international delta network.
- Several questions were asked, amongst others concerning the means of communication within the network, membership of the network and funding.

Organization

In June 2011, the international network organization of Delta Alliance has become a legal entity by establishing the Foundation "Delta Alliance International".

- Delta Alliance International is managed by an International Governing Board and an Advisory Committee which main task is to advice the Governing Board on strategic and operational issues.
- The International Secretariat is based in the Netherlands and is amongst others responsible for supporting the International Governing Board and the Advisory Committee

Wings

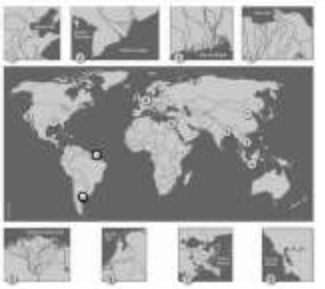
A Wing is a network of organizations in a specific country or area, which is dealing with delta-related issues.

A Wing must be recognized and admitted to the Foundation by the International Governing Board. Currently, Delta Alliance International includes 10 wings

Wings

Netherlands
Egypt
Bangladesh
Brazil
Vietnam
Indonesia
Mississippi
California
China
Argentina

Wings



Mission and Strategy

Mission:

To improve the resilience of deltas worldwide

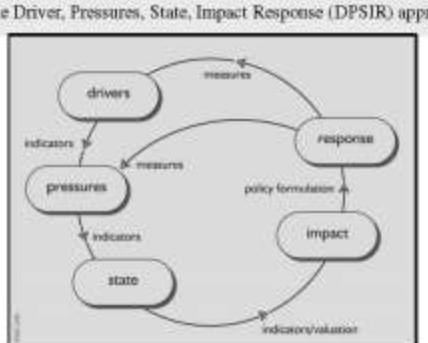
The strategy is to:

- *envisioning and defining resilience for deltas*
- *measuring and monitoring resilience*
- *reporting and creating pressure to improve resilience*
- *providing inspiration to improve resilience*
- *providing assistance to improve resilience*

The Driver, Pressures, State, Impact Response (DPSIR) approach

- The DPSIR framework helps in finding the root causes of environmental problems, the so-called drivers.
- These are mostly found in the broader societal context (e.g. population growth is a major driver of many environmental problems).
- But also natural phenomena could act as important drivers.
- Also global environmental and economic developments, such as climate change and international oil and commodities markets are important drivers for change.

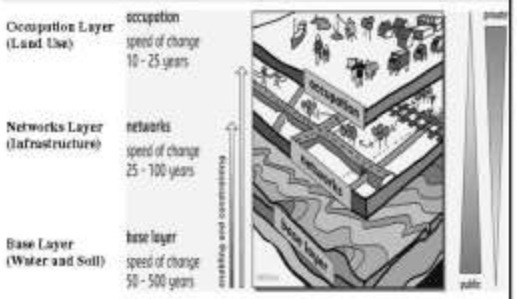
The Driver, Pressures, State, Impact Response (DPSIR) approach



Drivers of change

- Population growth
- Economic development
- Subsidence
- Technological development
- Climate change

Pressures and state of the delta: the Layer model



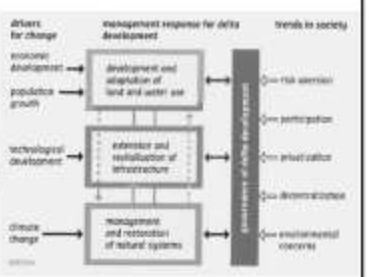
Delta management responses and Governance

Using the Layer model as a starting point, it becomes clear that there are three main response themes on which delta management could focus, i.e.

- The development and adaptation of land and water use (occupation layer),
- The extension of infrastructure (network layer), and
- Management and restoration of natural systems (base layer)

Delta management responses and Governance

This concept provides the framework for the assessment of delta development and management responses used for the comparative overview of deltas.

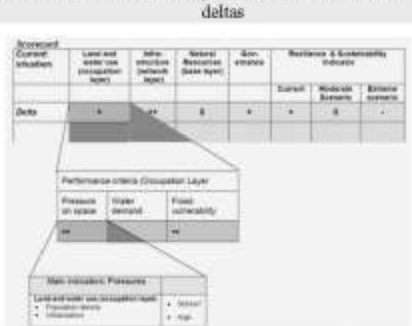


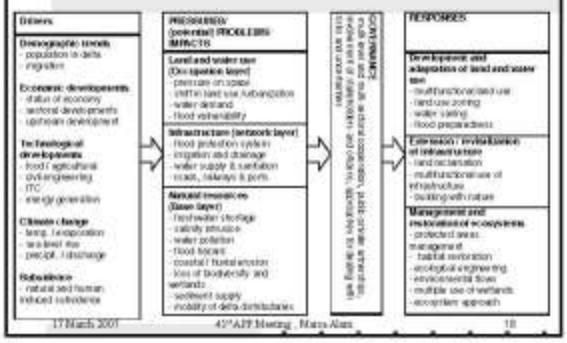
Governance Strength

The governance structure of deltas may be strengthened through different ways:

1. Promoting a better co-operation between different levels and sectors of government taking into account trends of decentralization and the need for (national) coordination.
2. Facilitating the cooperation between government and the private sector taking into account trends of privatization but also the need to safeguard the public interest.
3. Better involving stakeholders and citizens in development and management issues to promote the societal acceptance of development projects as well the long term sustainability of development projects (arrangements and incentives for maintenance).
4. Creating arrangements for dealing with uncertainties and sharing of risks (insurance).

Relation between indicators, performance criteria and scores for deltas





DRIVERS	Main indicators
Demographic trends - population in delta - migration	- number of people and growth rate - migration trend in delta (annual percentage in/out)
Economic developments - status of (total) economy - sectoral developments - upstream development	- per capita GDP, growth rate, % contribution by delta - main sectors, growth rate - unemployment rate - (planned) dams in main tributaries in the catchment
Technological developments - food / agricultural - civil engineering - ITC - energy generation	- Percentage of GDP spent on innovation and research in each sector
Climate change - temperature / evaporation - sea level rise - precipitation / discharge	(Downscaling of global IPCC scenarios) - change of temperature / evaporation - change of sea level (mm/year) - change of precipitation (mm/year) or river discharge (MCM/year)
Subsidence - natural and human induced subsidence	- cause of subsidence (e.g. gaswgin, grond water extraction or oil exploration) - rate of subsidence (mm/year)
PRESSURES/PROBLEMS	Main indicators

DRIVERS	Main indicators
Land and water use - pressure on space - shift in land use / urbanization - water demand - flood vulnerability	- number of inhabitants, population density, change in land value - % urban area, urbanization rate - water deficit / number of days with interrupted water supply - % area vulnerable for flooding / number of vulnerable people - value of vulnerable assets
Network / Infrastructure - flood protection system - irrigation and drainage - water supply & sanitation - roads, railways and ports	- flood risk (safety level), % of delta protected (high-medium-low) - % or delta under irrigation - % of infrastructure which needs to be upgraded - number of floods or flooding days per year - %, people with access to water supply, % connected waste water - water sanitation risk index* - density of infrastructure, number of ports (+ volume of goods)
Natural resources - freshwater shortage / salinity intrusion - pollution - flood hazard - coastal erosion / wetland loss - biodiversity loss	- number of droughts or drought days per year / % of delta with salinity problems - % of polluted areas (water, soil, air) - frequency of storms (storm surge) / frequency of extreme river discharge, flood hazard level (high-medium-low)

DRIVERS	Main indicators
- sediment supply - mobility of delta distributaries	- annual loss of land (km2/year) / average erosion rate (m/year) - total area of wetlands / % of wetlands protected by treaties - biodiversity index (e.g. LPI)* - soil erosion in catchment (billion/year) - fluvial sediment transport (Mton/year) - river discharge (qualitative and variability) - % of sediment trapped in reservoirs - existence of dykes in tributaries etc. along delta distributaries
GOVERNANCE	Main indicators
- multi-level and multi-sectoral cooperation	- existence of integrated plans (delta plan, basin or adaptation plan etc.) - existence of inter-ministerial committees, multi-scale level committee etc.
- public-private partnerships	- number of PPP's - scale of PPP's (geographic, budget, time span)
- involvement of stakeholders and citizens	- existence of legal instruments for participation (e.g. spatial planning instruments) - number of NGO's involved in planning and decision making
- approaches for dealing with risks and uncertainties	- existence of adaptive management, adaptation strategies etc. (long-term) - existence of risk management, emergency systems etc. (short term)

17 March 2007 40th APP Meeting - Nuwa Alain 21

Scorecard

The idea behind a scorecard is to present a highly aggregated evaluation of the state of the delta, without the need to go through background data and analyses.

Besides the current situation two development scenarios are recognized:

Scenario 1, moderate perspective 2050: medium economic growth (1.2 %, Regional Communities-scenario) and related medium technological developments, combined with medium climate change and sea level rise (to be determined by expert)

Scenario 2, extreme perspective 2050: high economic growth (1.7%, Transatlantic Market–scenario) and related high technological developments, combined with high climate change and sea level rise (to be determined by expert)

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Nile Delta

23

Summary of drivers of change

Demographic trends

About 40 million inhabitants are living in the Nile delta. The population density is about 1000 inhabitants/ km2 with a growth rate of 2% per year.

Economic developments

Results of the economic and financial performance indicated a great improvement during FY 2006/2007 and first quarter of FY 2007/2008. Egypt's economy achieved a growth rate of 7.1% which is the highest growth rate in the preceding 10-year period.

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Summary of drivers of change

Tourism used to represents 11.3% of GDP, 40% of the total Egypt's non-commodity exports and 19.3% of Egypt's foreign currency revenues.
The industrial sector's contribution to the GDP in 2006/07 was around 17.2%.
The agriculture sector accounts for roughly 14.8 % of GDP. Also, agriculture contributes about 30% to Egypt's commodity exports, which makes it a major revenue-generator. And, of Egypt's overall labour force, 30% works in the agricultural sector, mostly in the Nile delta.
The economic importance of the Nile delta comprises industrial centers, commercial and fishing harbours, large urban areas, tourism centers, agriculture activities, gas and oil production, and fisheries

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Summary of drivers of change

Climate change:
SLR, salt water intrusion leading to problems with soil and water salinization, erosion and accretion, and changes in wave and current patterns.

Subsidence:
The coastal zones of the Nile delta is tilting with rates vary from 0.5 to 4.0 mm/year eastward.

Technological developments:
In the field of hydraulic engineering, coastal engineering, hydrodynamics, and water management many research programs of NWRC, research institutions and universities have been carried out.

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Research Gaps

- Multi-disciplinary research to study climate change impacts and resilience across the different layers and sectors of the delta.
- Socio-economic impacts of the climate changes, especially to the most vulnerable communities and sectors.
- Impacts of sea-level rise on soil and water salinity, agriculture, wetlands ecosystems and fisheries, patterns of waves and currents, and drainage infrastructure
- Impacts of climate changes on water resources, water requirements, and agriculture

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Summary of pressures in Occupation layer

pressure on space
With half of Egypt's population of 80 million living in the delta and a population growth rate of nearly 2% on available space is the main issue of the Nile delta

vulnerability to flood
River floods are minimized through the High Dam and coastal storms are rather mild.

freshwater shortage
The entire country is dependent on Nile water inflow. As demands continue to rise, freshwater shortage will increase in the future.

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Research Gaps

- Land Use and Land Cover change models. Appropriate models for SLR as well as climate change and ecosystem issues, including vegetation changes and loss of ground surface to permanent sea water flooding
- Spatial planning – How can we optimally integrate the water management and sea flooding protection safety infrastructure into spatial planning concepts?
- Water use and treatment in industry, domestic and agriculture – Which innovations are needed in industry, domestic and agriculture for treatment and more efficient water use?
- What are opportunities of using natural protectorates areas for water retention in salinity areas?

Summary of pressures in Network layer

Ageing infrastructure

The extensive irrigation and drainage system is stretched to its limits; there is a constant need for efficiency improvement

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Summary of pressure in Network Layer

Research gaps

- Could wetlands function as blockades against salinization of groundwater and salt water intrusion?
- Water efficiency improvement in times of climate change
- Rehabilitation of water and drainage control/pumping structures
- How to develop more environmental friendly constructions for coastal protection infrastructure?
- Development of ICZM (recently IWCZM)
- What are opportunities for recharging drainage water into coastal groundwater aquifers to minimize sea water intrusion?

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Summary of pressures in Base layer

Coastal erosion
Due to Aswan dam most of the Nile sediments are trapped in Lake Nasser. Sediment balance at the coast is disturbed, leading to coastal erosion

Loss of biodiversity
As the bird-rich coastal lagoons are at the end of the system, their water quality is threatened by salinization and pollution.

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Research gaps

- How can we use natural processes for land reclamation and sustainable delta management?
- Which morphological and ecological changes are currently occurring in the delta and are their rates changing?
- A detailed picture of future climate-change related changes (sea-level rise, wave and current patterns) is needed for planning adaptation of infrastructure. Especially levels of uncertainty in predictions need to be quantified.
- Rate of erosion and measures for coastline protection.
- An ecological model should be developed to observe the change in wetlands bio-diversity due to human intervention
- A well calibrated and validated salinity model of sea water intrusion should be developed to understand the existing situation and to analyze the impact of climate change and sea level rise on salinity and its consequences on agriculture, fisheries, drinking water and biodiversity

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Research gaps

- Climate change impacts on the Nile Delta. Information is needed by coastal managers to adapt to climate change, including inland, coastal and near-shore water quality, inland flooding, coastal erosion and patterns, wave and current patterns, saltwater intrusion, wetland loss and beach loss, and socio-economic impacts.
- Liquefaction, groundwater level rise impacts, subsidence due to pumping, instability of foundations with water level rises, and sea defenses failure.
- More interdisciplinary research needs to be done into the loss/change of biodiversity and the relationship between lack of sediment and land subsidence and coastal erosion.

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Research gaps

- Digital Elevation Model is highly needed for the whole Nile Delta.
- Periodical soil surveys as a basis to establish fertilizer rates, continued restoration and maintenance of agricultural drainage systems, as well as for installing new drainage systems where needed
- Development of community programs to turn these waste materials into inputs (fertilizers, water, energy), possibly combining it with agricultural waste, for local reuse (cradle to cradle).

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Summary of governance issues

Cooperation between (scale) levels and sectors of government

Integrated Coastal Zone management is badly needed. This will require a further development of the institutional situation with regard to the mandate of national and local authorities to control and manage coastal developments.

Cooperation between government and private sector

Increasing private public participation (PPP's) is one of the policies of the Government.

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Summary of governance issues

Involvement of stakeholders and citizens

- Although the Government of Egypt has realized the importance of stakeholders and citizens involvement in decision making process to increase public acceptability, the involvement is limited.
- The involvement of stakeholders and citizens is relatively higher at local level, whereas at the provincial and national levels are less.
- A new master plan for the coastal zones is still far from community participation

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Summary of governance issues

Approaches for dealing with risks and uncertainties

- To reduce loss of lives and land, Egyptian Government has implemented a comprehensive plan to manage the shoreline of the Nile delta.
- There is a growing attention for awareness rising on climate changes impacts.
- Vulnerability of coastal zones to inundation due to sea level rise has been studied and many observation processes have been practiced.

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Research gaps

- A linked management approach that sees the river basin and coastal area as one interdependent system should be developed.
- Salinity is an important factor for agriculture, drinking water and fisheries. Salinity forecast system needs to be developed for the coastal area as sea level rise impacts threaten soil and groundwater quality.
- Adaptive management techniques need to be improved through better education and legal instrumentations.
- Data collection, monitoring and evaluation system requires improvement. Work on integrating policies and initiatives of National plans are required.

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Research gaps

- Water pollution is a challenge for sustainable development plans in the Nile Delta as well as the coastal wetlands due to insufficient roles and laws.
- Improve the accuracy of climate changes impacts prediction.
- Measures to reduce risks: local knowledge and awareness.
- Enhance roles of provincial and local authority/officials.
- Legal reform and institutional setup are needed.
- Integrated Coastal Zone Management Plan needs to be initiated.
- Development of programs to improve the living standards of the rural inhabitants, and reducing poverty rates in the rural areas.

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Nile Delta Scorecard

Delta	Land and water use (occupation layer	Infrastructure (network layer)	Natural Resources (base layer)	Governance	Overall Resilience & Sustainability Indicator
Current Situation 2010	-	0	-	0	-
Scenario 1 moderate 2050	-	0	-	0	-
Scenario 2 extreme 2050	--	-	--	0	--

Scorecard:
resilience/sustainability: ++ (very good), + (good), 0 (medium), - (low), -- (very low)

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Clarification notes on the ND score card

- The current situation in the Nile delta can be described as close to moderate rather than low. The pressures on the occupation layer and the base layer will increase due to population growth and economic development in the country.
- Furthermore, climate change and sea level rise will make the situation worse unless mitigation measures will be deployed and adaptation strategies planed.

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Clarification notes on the ND score card

- The most critical issues will be related to increased salinization due to sea water intrusion, droughts in the Nile Basin and water resources management in the Nile Basin countries.
- Unless technological developments and Governance aspects are significantly improved, the overall resilience and sustainability indicator will significantly decrease in the future.

THANK YOU

Water Resources Management Programme

INTRODUCTION

Water Resources Management Programme

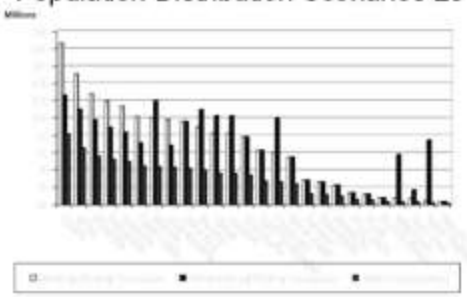
Delta Resilience Workshop
Cairo, June 16th-17th, 2013

2030 Strategic Vision for Wastewater Reuse in Egypt

Khaled AbuZeid, Ph.D, PE, PMP, CEDARE
Mohamed Elrawady, MSc, CEDARE
Tamer ElHakim, BSc, CEDARE

Water Resources Management Programme

Population Distribution Scenarios 2050

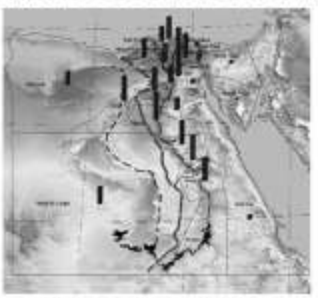


Water Resources Management Programme

CURRENT SITUATION IN EGYPT

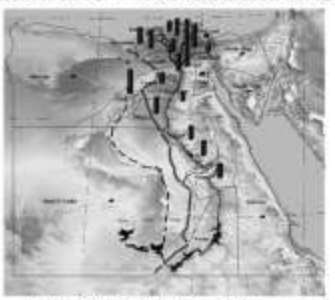
Water Resources Management Programme

Water Demand Second Scenario 2050



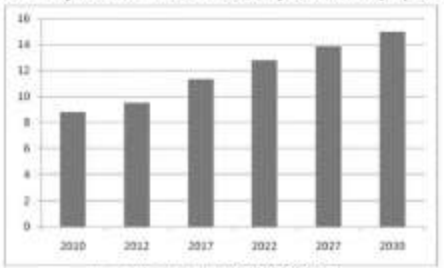
Water Resources Management Programme

Water Demand First Scenario 2050



Water Resources Management Programme

2030 Projected Water Supply Capacity (BCM)



(modified from HCWW, 2011)

Water Resources Management Programme

WATER SUPPLY

Water Resources Management Programme

WASTE WATER

Water Resources Management Programme

Municipal Water Status

- Current annual municipal water production from the Nile: 6.62 BCM/year
- Current annual municipal water production from groundwater: 1.38 BCM/year
- Current annual municipal water production from desalination: 61 MCM/year

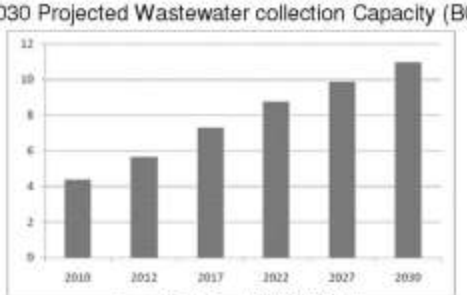
Water Resources Management Programme

Wastewater Status

- The annual produced wastewater amounts to 6.5 BCM, which is about 81 % of the total produced domestic water.
- About 5.5 BCM of wastewater is collected
- About 44%of the nationally produced wastewater is not treated, which is equivalent to 2.85 BCM.
- 3.65 BCM of wastewater are treated annually, 0.73 BCM of which (20%) are treated primary treatment, and 2.92 BCM (80%) are treated secondary treatment.
- The wastewater collection network has a total length of 39,000 KM.

Water Resources Management Programme

2030 Projected Wastewater collection Capacity (BCM)



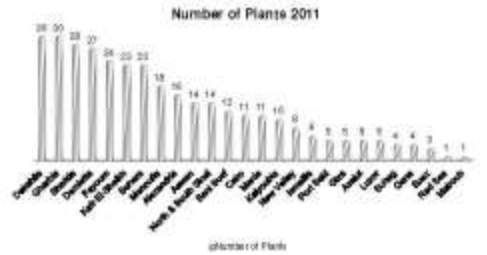
(modified from HCWW, 2011)

Water Resources Management Programme

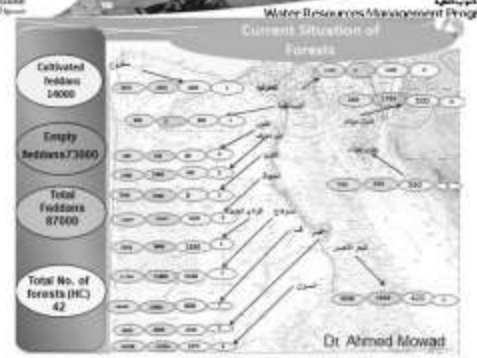
WASTEWATER REUSE

Water Resources Management Programme

Wastewater Treatment Plants



Water Resources Management Programme



Water Resources Management Programme

Waste Water Reuse in Agriculture

- According to HCWW, 300 MCM of the treated wastewater is used annually for irrigation all over Egypt
- The total amount of officially reused agricultural drainage is 6.3 BCM (NWRC, 2008). About 13.5 BCM of mixed agriculture drainage and wastewater is finally produced. The latter amount consists of about 7 BCM of agricultural drainage of very poor quality due to multiple re-use, as well as 6.5 BCM of municipal and industrial wastewater.

Water Resources Management Programme

	Grade A	Grade B	Grade C
BOD mg/l	<20	<60	<400
TSS mg/l	<20	<50	<250
Potential number of the coliomic group in 100 cm³	<1000	<5000	N/A
No. of eggs of nemetodis No./l	<1	<1	N/A

Grades of treated wastewater (Wastewater Reuse Code, 2005)

Water Resources Management Programme

Main Rules that Govern the Wastewater Re-use Process

- Law 93/1962 & Decree 44/2000 for discharging on public drains.
- Law 48/1982 and its executive regulations regarding the protection of the Nile and waterways from pollution.
- Egyptian Code No. 501/2005 for wastewater Reuse

Water Resources Management Programme

- Decree No. 603/2002 for minister of agriculture , which prohibits the use of treated and untreated wastewater in irrigating conventional plants , but allows its use in wood trees , ornamental trees , and fuel-production trees (ex jatrova , jujoba, …). (However, it can be argued that the decree somehow contradicts with the reuse code)

Water Resources Management Programme

Grade	Agricultural Group	
A	G1-1. Plants and trees grown for greenery of tourist villages and hotels	Grass, Saint Augustine grass, Leucaenea plants, ornamental palm trees, climbing plants, flowering bushes and trees, wood trees, and shade trees
	G1-2. Plants and trees grown for greenery inside residential areas of the new cities	Grass, Saint Augustine grass, Leucaenea plants, ornamental palm trees, climbing plants, flowering bushes and trees, wood trees, and shade trees
B	G2-1. Fodder Field Crops	Sorghum
	G2-2. Trees producing fruits with cernels	On condition that they are produced for processing purposes such as olives, mango, date palm, and almonds
	G2-3. Trees used for green belts around cities and afforestation of highways or roads	Casuarina, camphor, silver carcara (salt tree), oleander, fruit producing trees, date palm and olive trees
	G2-4. Nursery Plants	Nursery plants of wood trees, ornamental plants and fruit trees
	G2-5. Roses and Cut Flowers	Local rose, eagle rose , violets (e.g. gladiolus)
	G2-6. Fiber Crops	Flax, jute, Kenaf, sisal
	G2-7. Mulberry for the production of silk	Japanese mulberry
C	G3-1. Industrial Oil Crops	Jojoba, castor oil plant, and safflower
	G3-2. Wood Trees	Eucs, camphor, and other wood trees

Permissible Agricultural groups by grade (Reuse Code, 2005)

Water Resources Management Programme

Obstacles and Institutional Constraints

- The financial resources required to increase the national coverage of wastewater collection, and to upgrade the level of treatment.
- The proximity of potential arable land to wastewater treatment facilities and the different physical conditions surrounding each treatment plant.
- The environmental and health concerns and perception associated with using treated wastewater for agriculture.
- The Egyptian wastewater re-use code that prohibits using secondary and tertiary treated wastewater for edible crops.
- The Irrigation & Drainage Egyptian law that prohibits conveyance of any level of treated wastewater through irrigation canals.

Water Resources Management Programme

OBSTACLES AND INSTITUTIONAL CONSTRAINTS TOWARDS ACHIEVING STRATEGIES

Water Resources Management Programme

PROPOSED STRATEGIC VISION FOR WASTEWATER REUSE IN EGYPT TILL 2030

Water Resources Management Programme

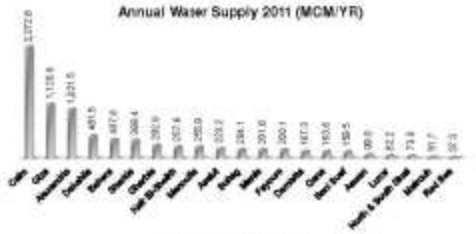
Obstacles and Institutional Constraints (2)

- The Environmental & health regulations & laws.
- The generation of new water demands by the wastewater companies due to directing the collected wastewater to Wood and Bio-fuel tree plantations.
- The anticipated competition over treated wastewater by the irrigation sector that needs to satisfy national water demands, and the agriculture sector that needs to satisfy agriculture expansion plans, and the water and wastewater sector that needs to generate income from treated wastewater produced to cover its operation and maintenance costs.
- The risk of not being able to market the agriculture products for export to neighboring markets such as the EU and the Gulf states due to the use of treated wastewater.
- The Health & Environmental hazards associated with improper handling of the different levels of treated wastewater by users.

Water Resources Management Programme

2011 Water Supply

Annual Water Supply 2011 (MCM/YR)

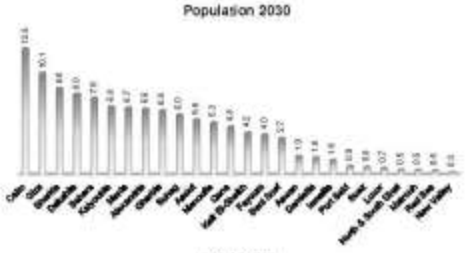


Annual Water Supply(MCM/YR)

Water Resources Management Programme

Out of Valley 2030 Population Projection Scenario

Population 2030



Population2030

Water Resources Management Programme

2011 Secondary Treated Wastewater

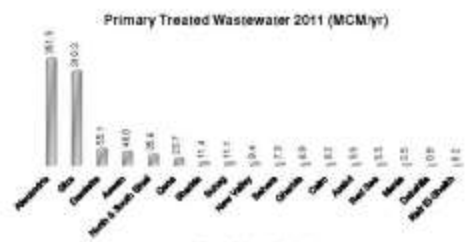
Secondary Treated Wastewater 2011 (MCM/yr)

Secondary Treatment (MCM/yr)

Water Resources Management Programme

2011 Primary Treated Wastewater

Primary Treated Wastewater 2011 (MCM/yr)

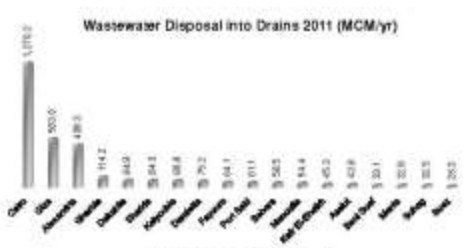


Primary Treatment (MCM/yr)

Water Resources Management Programme

2011 Treated WW Disposal into Drains

Wastewater Disposal into Drains 2011 (MCM/yr)

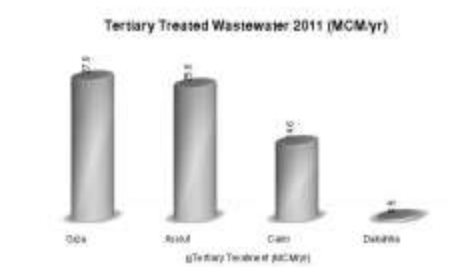


Drainage to the main Network (MCM/yr)

Water Resources Management Programme

2011 Tertiary Treated Wastewater

Tertiary Treated Wastewater 2011 (MCM/yr)



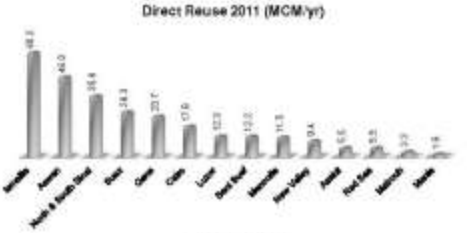
Tertiary Treatment (MCM/yr)

Water Resources Management Programme

2011 Untreated Wastewater

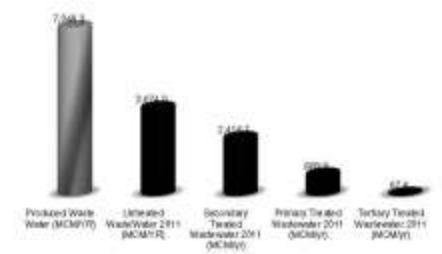
Water Resources Management Programme

2011 Direct Reuse



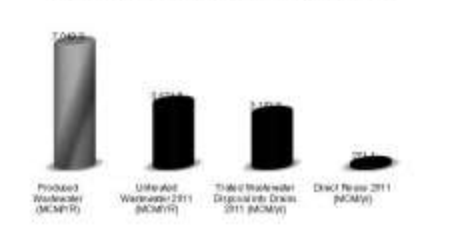
Water Resources Management Programme

National Wastewater Treatment Level 2011



Water Resources Management Programme

National Wastewater and Reuse Status 2011



Water Resources Management Programme

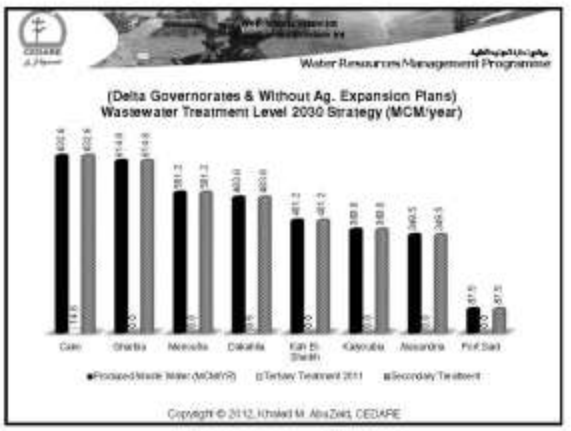
Proposed 2030 Strategic Directions

- Maintain existing forest expansion areas of 2011 without further expansion and direct future treated wastewater to Agriculture Expansion areas
- Modify Wastewater Reuse Code to allow for expansion in permissible agriculture crops cultivation on treated Wastewater according to international standards (e.g. new WHO guidelines)
- Develop governorate specific plans by matching Agriculture expansion plans with urban development plans, WSS plans, and Water Resources Management plans.
- Embrace an out of Valley scenario for Urban Expansion

Water Resources Management Programme

Proposed 2030 Strategic Directions

- Delta and Nile Valley Governorates Plants to Dispose secondary treated Wastewater into Agriculture drains, and reuse downstream through Ag. Drainage Mixing Pumping Stations
- Desert front & Agriculture Expansion Governorates to direct future treated wastewater directly to agriculture expansion areas (not out of plan agriculture), while maintaining existing 2011 disposal into drains
- Upgrade all treatment levels to secondary treatment level by 2030
- Maintain existing tertiary treatment levels of 2011


Water Resources Management Programme
(Delta Governorates & Without Ag. Expansion Plans)
Wastewater Treatment Level 2030 Strategy (MCM/year)
Cairo
Gharbia
Menoufia
Dakahlia
Kafr El-Sheikh
Qalyoubia
Alexandria
Port Said
Produced Waste Water (MCM/YR)
Tertiary Treatment 2011
Secondary Treatment
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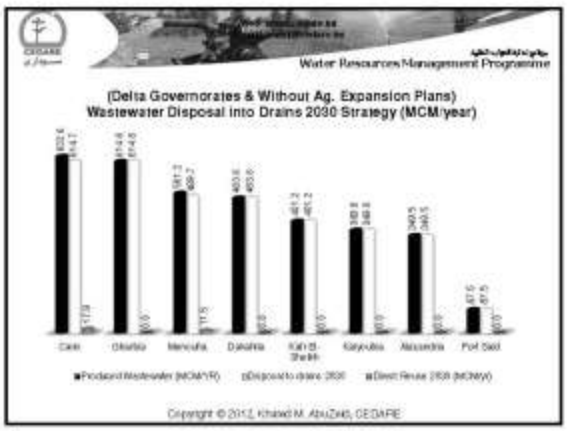
Water Resources Management Programme
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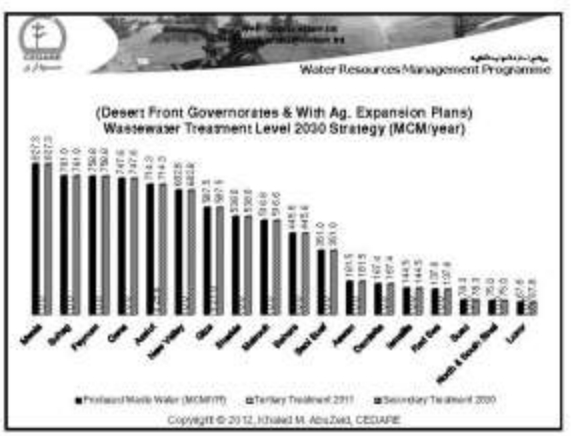
Water Resources Management Programme
(Desert Front Governorates & With Ag. Expansion Plans)
Wastewater Treatment Level 2030 Strategy (MCM/year)
Produced Waste Water (MCM/YR)
Tertiary Treatment 2011
Secondary Treatment 2030
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Water Resources Management Programme
(Desert Front Governorates & With Ag. Expansion Plans)
Wastewater Direct Reuse 2030 Strategy (MCM/Year)
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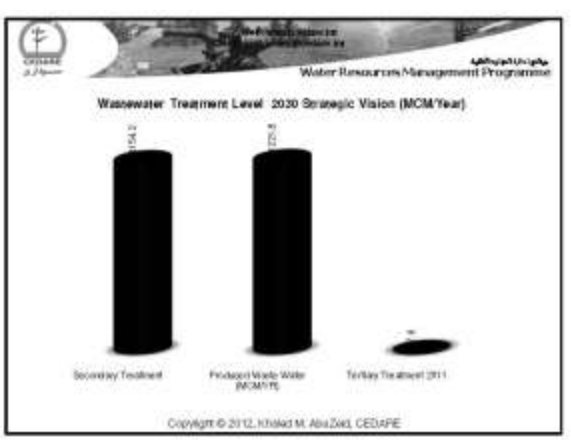
Water Resources Management Programme
Wastewater Treatment Level 2030 Strategic Vision (MCM/Year)
Secondary Treatment
Produced Waste Water (MCM/YR)
Tertiary Treatment 2011
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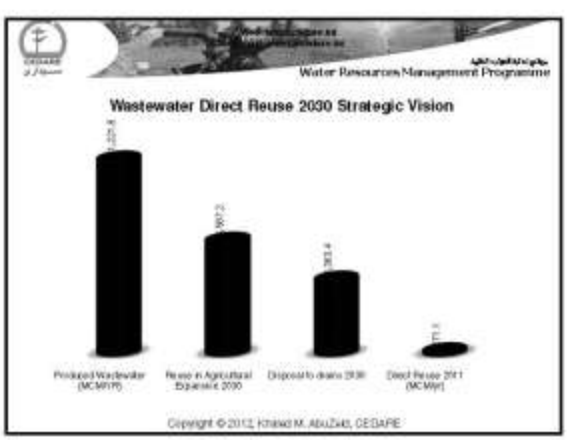
Water Resources Management Programme
Wastewater Direct Reuse 2030 Strategic Vision
Produced Wastewater (MCM/YR)
Reuse in Agricultural Expansion 2030
Disposal to drains 2030
Direct Reuse 2011 (MCM/yr)
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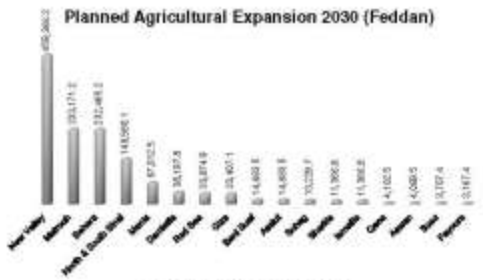
Water Resources Management Programme

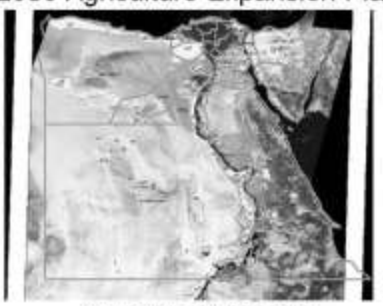
Planned Agricultural Expansion 2030 (Feddan)



Planned Agricultural Expansion 2030 (Feddan)

Water Resources Management Programme

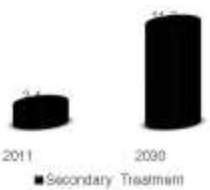
2030 Agriculture Expansion Plan



Water Resources Management Programme

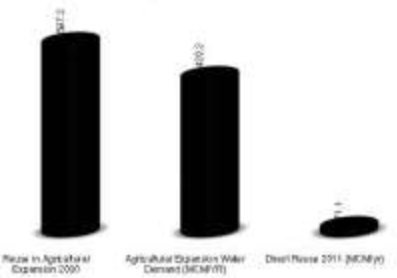
Required Investment between 2012-2030
(almost 30 Billion $, about 1.5 billion $/year)

Total Required Investment
8.8 BCM *20LE=176 Billion LE



Water Resources Management Programme

Water Demand for Agriculture Expansion & Reuse in 2030



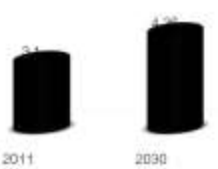
Water Resources Management Programme

PROPOSED INTER-MINISTERIAL AGREEMENT
&
ROLE OF CONCERNED MINISTRIES

Water Resources Management Programme

Agriculture Drainage
Mixing Pump Expansion Requirement

Increase in Reuse Pump Capacity
4.36 BCM-3.1 BCM=1.26 BCM



Water Resources Management Programme

Ministry of Industry and Foreign Trade

- To regularly compile and disseminate data that shows quality and quantity of water usage and disposal from the factories
- To prevent untreated industrial disposal into water bodies
- To register all nonregistered factories.
- To ensure the existence of treatment plants inside the factories before giving the required license for the factories to operate.
- To ensure the operation of the treatment units in the factories at license renewals.

Water Resources Management Programme

Ministry of Agriculture and Land Reclamation

- Selecting the crop composition according to the wastewater reuse code and water quality.
- Allocating the areas that can be cultivated in cooperation with the HCWW and MWRI
- Supervising and controlling the agricultural process.
- Putting and applying the laws to prevent violations of farmers.
- Controlling the reuse of treated sludge in agriculture according to law 254 for year 2003.
- Controlling and supervising the quality of organic fertilizers

Water Resources Management Programme

Ministry of Health and Population

- To supervise the quality control and quality standards of the treated wastewater.
- To supervise the quality control of the treated wastewater used in agriculture.
- To supervise the quality control of the treated industrial wastewater quality drained in water ways.

Water Resources Management Programme

Ministry of Environmental Affairs

- To confirm the operation of the treatment plants inside the factories.
- To monitor the industrial effluents water quality
- To make sure appropriate treatment is included in EIAs and Strategic EIAs of industrial zones

Water Resources Management Programme

Thank you for your attention

Water Resources Management Programme

Ministry of Drinking Water and Sanitation Services

- To specify the land areas to be cultivated directly or indirectly by treated wastewater in cooperation with the Ministry of Agriculture.
- To regularly indicate the treated wastewater quality and quantity that should drain into agricultural drains and that could be directly reused
- To confirm the operation status of the treatment and to control the quality standards of treatment
- To explore agriculture reuse investment opportunities to share costs
- To allocate and supervise the industrial wastewater drainage to the sanitation network.


تم بحمد الله