



APP

Presentation outline

- **Introduction**
 - Why brackish groundwater use
- **The workshop on: potential use of brackish groundwater in Agriculture & Aquaculture**
- **Workshop setup**
- **Workshop outcome**
- **Conclusion & Recommendation**



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Introduction: Why use of Brackish groundwater?

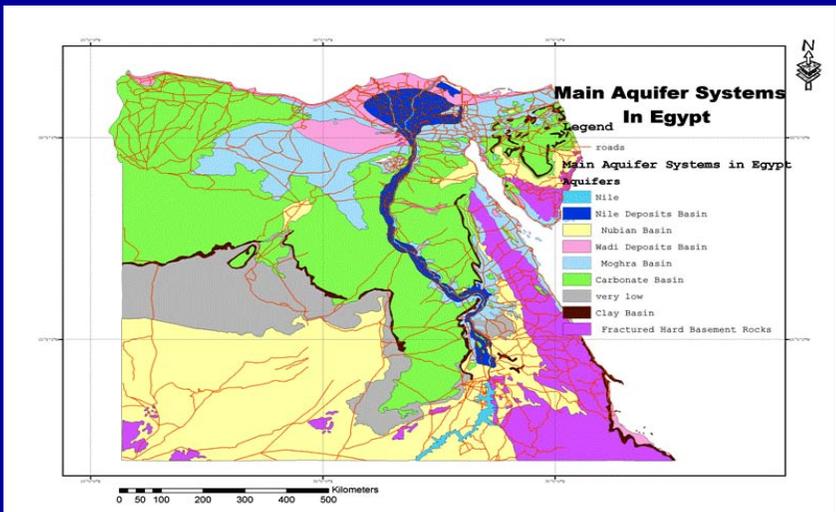
- Limited water resources
- Population drastic increase (1 million/ year)
- Water conveyance outside the Nile Valley and Delta is subjected to high cost and losses.
- Fresh GW has limited potential due to recharging factors and feasibility of extraction.
- Flash floods and rainfalls are very limited in magnitude and occurrence.
- Desalination of seawater is still costly (residents live in about 80-100 km from coast).
- Ample brackish water resources (yearly sustainable yield: 1,744 Bcm)
- Sustainable production systems for: food (crop, fish), fodder, fuel, other products
- Clean water resources (not polluted)
- Export ?

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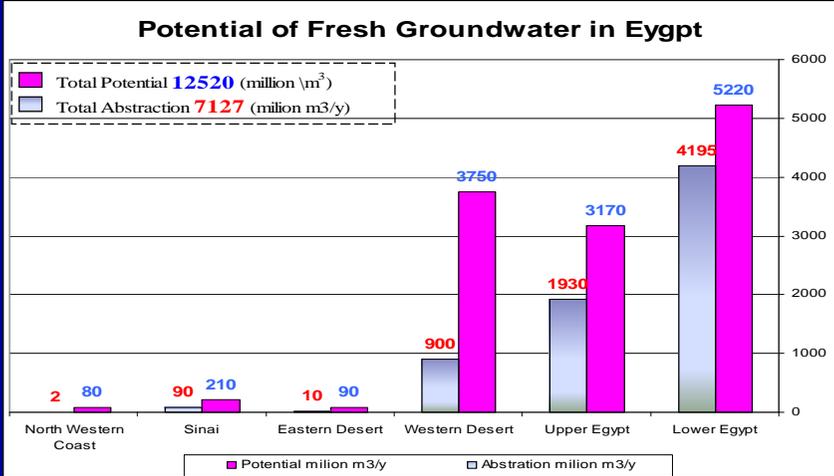
Main Groundwater Aquifer Systems in Egypt



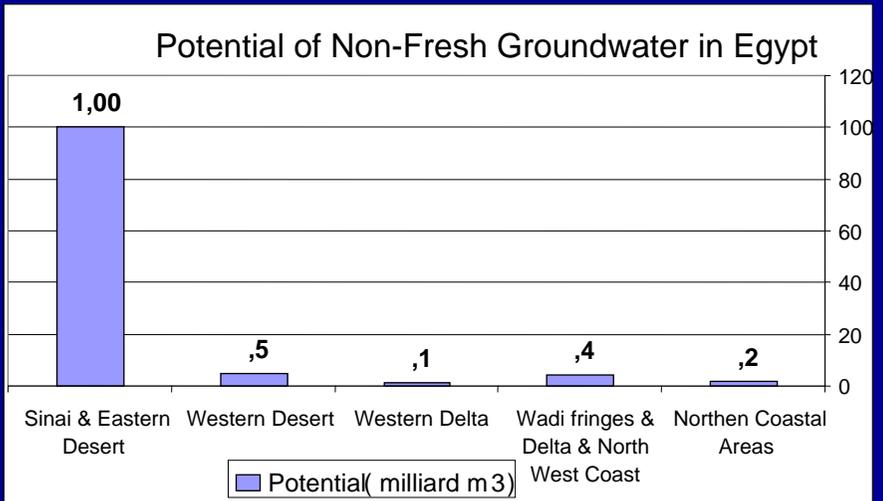
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Current and Potential Abstraction of Fresh Groundwater in Egypt



Potential of Non-Fresh Groundwater in Egypt





Points of Concern for Using Brackish Water Resources

- (1) Can brackish water resources play significant role in sustainable development in an environmentally sound and socially acceptable manner?
- (2) Is desalination of brackish water an economically and technically feasible option,
- (3) What are the potential areas for PPP in brackish water extraction and management to bring about cost-effective technological options to this field?



Points of Concern for Using Brackish Water Resources *Continue*

- (4) What can Egypt learn from the experience of other countries.
- (5) What are the gaps in the existing MWRI capacity for effective use of brackish water and how can these gaps be filled?
- (6) Does the IWRM Action Plan sufficiently consider brackish water resources for developmental initiatives (quantity, quality, potential uses and time horizon)?
- (7) What is the required mechanism for inter-ministerial coordination for brackish water utilization.



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APP organized the WORKSHOP ON BRACKISH WATER USE IN AGRICULTURE AND AQUACULTURE

CAIRO, 2- 5 December 2006

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The workshop

Objectives:

- To discuss the potential use of brackish groundwater in Agriculture & Aquaculture;
- Identifies and evaluate the Egyptian opportunities;
- Highlight the existing initiatives;
- Determine ways to proceed

Set up:

- Presentations from experts (National & International)
- Excursion to integrated farm
- Working group discussions
- proceeding

Participation from:

The World Fish Centre, IWMI, MoALR, Universities, MWRI and others

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Presented Topics

- Potential for Brackish Groundwater use : A Vision for Egypt
- Brackish groundwater in the context of Egypt's agriculture and food policies
- Inevitability, opportunities and constraints for Brackish Water use in Agriculture and Aquaculture
- The use of Brackish Water for Crop Production (Case studies from Egypt, Jordan and Pakistan)
- Making the Most of a Bad Situation: Increasing Water use Efficiency & Generating Economic Opportunities in Jordan
- Relevant Legislation and Institutional Requirements for using Brackish Groundwater
- The Economic Significance of the use of Brackish Groundwater
- Activities of SWERI in the field of using Low-Quality Water in Crop Production



IN "KERAM" SYSTEM EACH STAGE OUTPUT IS SAFETY INPUT FOR THE NEXT STAGE

TILAPIA RAISING

CATFISH RAISING

CATTLE AND SHEEP RAISING

SOIL ENRICHMENT AND CULTIVATION OF CLOVER AND OTHER CROPS

ORGANIC FERTILIZER

BIOGAS UNIT

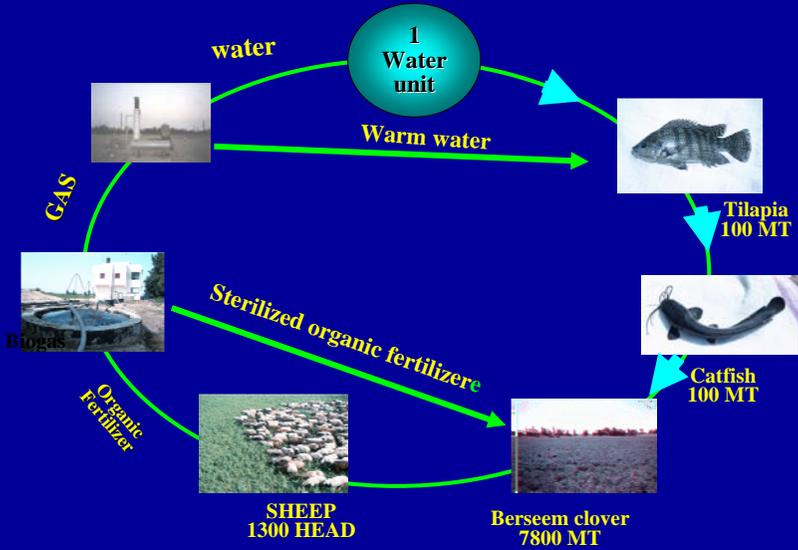
CLEAR ENERGY



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KERAM SYSTEM (SERIES)

ONLY ONE WATER UNIT





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Workshop outcome

Sustainable yield from brackish groundwater resources:

- **Renewable resources: annual recharge**
- **Non-renewable: a portion (e.g. 2%)**
- **Total potential yearly sustainable yield: 1,744 million m³**
- **Salinity ranges between 1000-30,000 ppm**

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Workshop outcome

Suitable production systems for:

- **Human food (crops, fish)**
- **Fodder (crops, aquatic products)**
- **Fuel (wood, bio-fuel)**
- **Other products (e.g. fertilizer)**

Brackish water based human food components:

- **Existing plant species (halophytes)**
- **New, more salt-tolerant cultivars**
- **Genetic engineering**
- **Aquaculture (fish, crustaceans)**

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Workshop outcome

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Animal feed/fodder:

Selected plant species, both halophytes and dry-zone species

Adapted technologies (hydroponics, rotation)

Use of brackish water species for fish

Fuel:

- Forestation, especially of marginal or degraded lands
- Selection of salt-resistant species
- Green material for bio-fuel

Other products:

- Oils and lubricants
- Flavours, pharmaceuticals, fibers
- Organic fertilizers

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Conclusions

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1.

- When conventional crops are adapted to brackish irrigation the economic returns are always rather low, even when more salt-resistant varieties are used. Still, this is the main research topic in the different Research Institutes.
- It would be better if this research effort would be used to identify non-conventional crops for which brackish situations are optimal.
- Even lower economic returns of conventional crops is acceptable in locations where no other opportunities exist for agricultural production

2.

For development of the efficient use of brackish groundwater, an integrated farming system seems most appropriate: aquaculture, followed by agri/horticulture and eventually followed by livestock.

3.

Since brackish groundwater is in principle free of pollutants, the economic returns from farming systems could be boosted by production of exportable commodities (fish, cash crops).

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Recommendations

1.

- To expedite and support all activities that will facilitate or accelerate the use of brackish groundwater for the production of food and other commodities, also because of the need to increasingly develop desert agriculture, where brackish groundwater is the only water resource.
- Start applied research into possibilities for the use of alternative every sources (wind, sun)

2.

Carry out an EIA on the use of brackish groundwater and on development of desert-based production systems, including economic and social dimensions. It was recommended to do this under the aegis of APP.

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Recommendations

3.

- Facilitate aquaculture development by actively extending the messages that
 - Fish does not *consume*, but only *uses* water
 - Aquaculture is a clean production system
 - Aquaculture discharge water has added value for agriculture

4. Adapt water use laws and regulations to the actual situation

(both through an inter-ministerial task force (MWRI, MALR, EEAA) with clear mandate and dead line)

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5.

- Initiate PPPs for development of the use of brackish groundwater. Since, however, the private sector seems somewhat hesitant to invest in new ventures, demonstration farms should be set up:
 - Biofuel production in the desert (e.g. *Jatropha* farm)
 - Oil production in the desert
 - Integrated farm in Kafr El Sheikh (within IIIMP)
 - Integrated farm in Northern Sinai
 - Integrated farm in Western Desert

(Supervision by National Water Council)