New Reclamation Mega Projects and Increasing the Pressure on Water System in the Nile Valley and Delta in Egypt

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Arid with limited and scarce water resources:
- Surface Water (Nile River)
- Groundwater
- Reuse of TSE
- Reuse of Agr. Drainage Water
Water Scarcity

Projected Water Scarcity in 2025

- Physical water scarcity
- Economic water scarcity
- Little or no water scarcity
- Not estimated

Note: Indicates countries that will import more than 10% of their cereal consumption in 2025.


http://iwmi.org
Main Source of Fresh Water
55.5 BCM/year
Naser Lake (National Strategic Reserve)

- 6000 km²
- 500 km along the river Nile
- 31.6 km³ storage capacity
- 90.7 km³ active storage capacity
- 41 km³ flood management storage
Groundwater

Main aquifer systems in Egypt

- Nile deposits Basin
- Mohra basin
- Wadi deposits basin
- Nubian basin
- Carbonat basin
- Clay
- Hard basement rocks

Well
Groundwater Monitoring
Water Closed System

Groundwater

Official Reuse in The Delta and Direct Return to the Nile and Unofficial

Fayoum Drainage

Effective Rainfall

ET from Free Surface

3.00

67.06

6.127

5.96

1.881

13.968

59.46

74.128

Multipliers:

1.00

0.65

1.00

Crop ET

41.441

Agricultural

Industrial Wastewater

Industrial

6.73

60.731

7.53

6.517

25.73

26.38

19.29

6.127

5.96

1.881

13.968

13.968

15.662

Sea and Lakes

Drainage to sea

Fresh Water to sea

2.90

6.517

2.90

1.00

Municipal

Sewage

All Quantities in BCM

0.70

4.60

59.46

74.128

3.00

67.06
Egyptian Water Management Deriving forces

- Population growth:
  - Ever-increasing Population Led to Increasing Pressure on Water & Land Resources

- Water Scarcity:
  - Limited Conventional Resources and Non-conventional Ones, while increasing Demand

- Sectors competition:
  - Increasing Sectors Demand (Irrigation, Drinking, Industry, …etc.)

- Food security:
  - Rural Poor need to withstand the limited food availability which is mainly a water dependent issue

- Pollution & emission:
  - Ever-increasing water and environment pollutants destroy the main elements in the food-chain

- Cost of new resources:
  - Lack of available financial resources required for new resources investments.
Population Growth and Per Capita Water Allocation (1897 - 2050)
Population Growth and Per Capita Land Allocation (1897 - 2050)
Current and Future Water Availability

**Demand:**
- Agriculture (84.5%)
- Dinking (6%)
- Industry (9.5%)

**Resources:**

- Nile Water: 57.5 - 55.5
- Rains and Floods: 1.5 – 1.0
-GW (Deserts & Sinai): 3.5 - 1.0
- GW (Valley & Delta): 8.0 – 6.5
- Agr. Dr. Reuse: 8.5 - 5.0
- Wastewater: 2.0 - 0.7
- Crop Pattern & IIP: 4.0 + 3.0

**Current (BCM) Future 2017**
### Current and Future Water Availability

<table>
<thead>
<tr>
<th>Source</th>
<th>2001</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Nile</td>
<td>52.5*</td>
<td>55.5**</td>
</tr>
<tr>
<td>Renewable ground water</td>
<td>4.8</td>
<td>7.5</td>
</tr>
<tr>
<td>Agricultural drainage water</td>
<td>4.5</td>
<td>8.4</td>
</tr>
<tr>
<td>Treated domestic waste water</td>
<td>0.7</td>
<td>2.5</td>
</tr>
<tr>
<td>Treated industrial waste water</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Desert aquifers</td>
<td>0.57</td>
<td>3.77</td>
</tr>
<tr>
<td>Rainfall and flush harvesting</td>
<td>-</td>
<td>1.5</td>
</tr>
<tr>
<td>Saving from management</td>
<td>-</td>
<td>1.5</td>
</tr>
<tr>
<td>Total</td>
<td>69.77</td>
<td>87.37</td>
</tr>
</tbody>
</table>
Opportunities and Major Tasks

**Opportunities**

- Availability;
- Technology;
- ± ve Impact on:
  - Natural resources;
  - Environment;
  - Public health.
- Sustainability.

**Major Country Strategy Tasks**

- Regulatory & policy framework;
- Integrated Planning;
- Efficient Economic mechanisms;
- Introduction to PPP approach;
- Raising Awareness/Maintain convincing;
- Decentralization & Participation; and
- Bridging research and Practice.
Sustainable Use

Requirements?

- Standards & Guidelines
- Monitoring & Evaluation
- Law Enforcement
- Appropriate Technology
- Operational Rules
- Awareness/Convince

Accommodation!

- At Abstraction
- During Delivery
- At End User
IRRIGATION DIRECTORATES

Nile Delta

Middle Egypt

Upper Egypt
## Irrigation Area depend on Nile Water (1997-2017)

<table>
<thead>
<tr>
<th>Region</th>
<th>1997 (1000 feddans)</th>
<th>2017 (1000 feddans)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Egypt</td>
<td>1307</td>
<td>1728</td>
</tr>
<tr>
<td>Middle Egypt</td>
<td>1093</td>
<td>10851</td>
</tr>
<tr>
<td>Fayoum</td>
<td>360</td>
<td>378</td>
</tr>
<tr>
<td>East Delta</td>
<td>2131</td>
<td>2,4461</td>
</tr>
<tr>
<td>Middle Delta</td>
<td>1551</td>
<td>1525</td>
</tr>
<tr>
<td>West Delta</td>
<td>1473</td>
<td>18861</td>
</tr>
<tr>
<td>Sinai (Surface Water)</td>
<td>0</td>
<td>620</td>
</tr>
<tr>
<td>Toshka (surface water)</td>
<td>0</td>
<td>540</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7915</strong></td>
<td><strong>10208</strong></td>
</tr>
</tbody>
</table>
Egypt lacks the necessary data in various sectors, especially water. The only measured resource is the Egypt Nile water quota downstream High Aswan Dam (HAD). There is no accurate measurement for either rainfall or flash floods. As for water quality measurements in Water courses, or for groundwater aquifers, they are very few, even along the Nile River and main canals. The available measurements are both limited and for only a few elements. There are also usually done on distant intervals.

It is expected that the irrigation improvement and crop pattern projects will not be finalized to save about 7 BCM/Year for the mega projects in Toshka and Sinai, which cost a lot of money and investments, therefore the water requirement for those two projects may be deduced from the released water to the Nile Valley and the Delta, moreover, Egyptian currently facing a great challenge which represented in constructing a number of dams in Ethiopia, that is expected effect on Egypt's share of Nile water, however.
Recent studies indicated that, the use of treated wastewater may not be possible, due to economic reasons, to provide sewerage facilities for all residents of rural and peri-urban areas, either now or in the near future. So, it should be considered an integral component in country’s national water strategic plan.

As a result, the focus of the field of wastewater management should change from the construction and management of regional sewerage systems to the construction and management of decentralized wastewater treatment facilities. Given the fact that in the near future, increasing demands are being made on freshwater supplies, it is clear that decentralized systems, will increase the opportunities for localized reclamation/reuse. Also, the use of anaerobic treatment as a first step offers good potentials for both on-site and off-site sanitation.

The role of scientific research should take its place to develop new affordable water saving techniques. The same role is significant for introducing new agriculture technologies, seeds and breeds that have high productivity, high diseases resistance and low water consumption.
Dr. Osama M. Sallam
Dr. Maher A. El Shewy
Thank You