

# Spatial Analysis of Access to Safe Water in Egypt

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**Keyword 1:** Access to safe water and sanitation services **Keyword 2:** Spatial Analysis **Keyword 3:** GIS **Keyword 4:** Global spatial information management

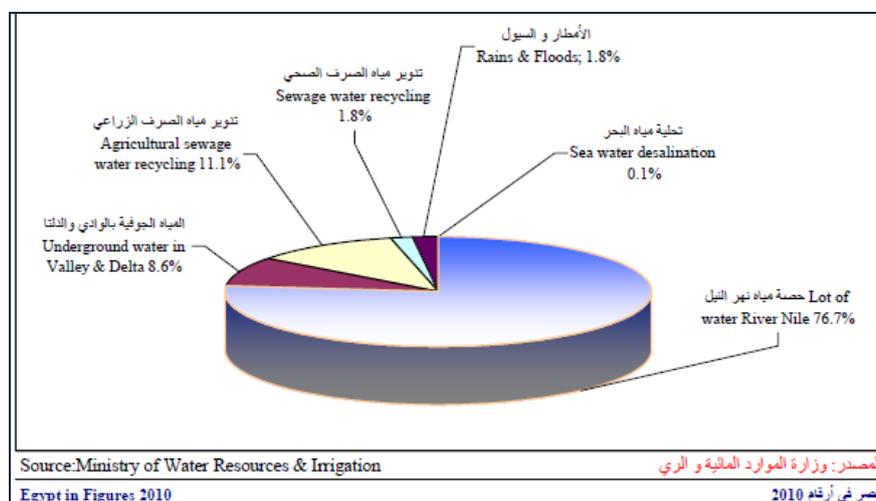
Water is an essential life-sustaining element .The key challenges of water management can only be understood within the context of water’s role in the world today. Water is the primary life-giving resource. Its availability is an essential component in socioeconomic development and poverty reduction. Every \$1 invested in improved water supply and sanitation yields gains, on average, of \$4-\$12, depending on the type of intervention. Almost one-tenth of the global disease burden could be prevented by improving water supply, sanitation, hygiene and management of water resources. Such improvements reduce child mortality and improve health and nutritional status in a sustainable way.

**My objective of this Study is** to give a better and visually integrated view about the status of access to safe water in Egypt .I use as a **source of data** Census 2006 GDB of central agency for public mobilization and statistics (CAPMAS). We use different methods of spatial analysis, also we use hierarchal model for representing data first accumulated data for 3 levels of administrative boundaries then more detailed macro data for buildings and households. The data associated with its spatial location contains different categories of water sources.

## 1. Egypt Water Resources

As seen from fig(1) and Table(1) the essential water resource of Egypt is Nile river which has 76% of total quantity of water and only 1.8% from rains and floods the other resources are underground water ,Agriculture sewage water recycling, sea water desalination.

**Fig(1)Percentage distribution of Egypt water resources by source 2008/2009**



**Table(1) distribution of Egypt water resources (05/06-08/2009)**

Unit : Milliar m3/Year

| Source                              | 2009/2008  |             | 2008/2007    |             | 2007/2006    |             | 2006/2005    |             |
|-------------------------------------|------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|
|                                     | %          | الكمية      | %            | الكمية      | %            | الكمية      | %            | الكمية      |
| Lot of water River Nile             | 76.7       | 55.5        | 76.7         | 55.5        | 79.3         | 55.5        | 79.8         | 55.5        |
| Underground water in Valley & Delta | 8.6        | 6.2         | 8.6          | 6.2         | 8.7          | 6.1         | 8.8          | 6.1         |
| Agricultural sewage water recycling | 11.1       | 8           | 11.1         | 8.0         | 8.1          | 5.7         | 7.4          | 5.1         |
| Sewage water recycling              | 1.8        | 1.3         | 1.8          | 1.3         | 1.9          | 1.3         | 1.6          | 1.1         |
| Rains & Floods                      | 1.8        | 1.3         | 1.8          | 1.3         | 1.9          | 1.3         | 1.9          | 1.3         |
| Sea water desalination              | 0.1        | 0.06        | 0.1          | 0.06        | 0.1          | 0.06        | 0.1          | 0.06        |
| <b>Total</b>                        | <b>100</b> | <b>72.4</b> | <b>99.94</b> | <b>72.4</b> | <b>99.96</b> | <b>70.0</b> | <b>99.54</b> | <b>69.2</b> |

Source : Ministry of Water Resources &Irrigation

## 2. Uses of Water

We can see from table(2) and fig(2) that the Agriculture consumes about 86% of total uses of water and Drinking ,Healthy uses are about 8% of total uses of water and the reminder percentage 6% distributes between industry, river navigation, waste evaporation from Nile and canals.

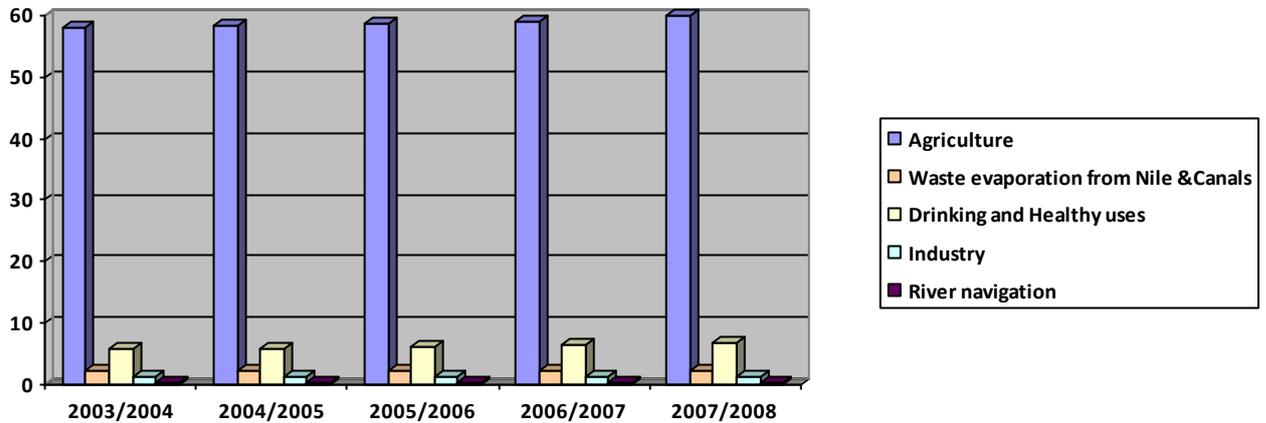
**Table(2) Distribution of Egypt water Uses (05/06-2008/2009)**

Quantity : Billion M3/year

| Uses of Water                       | 2003/2004   | 2004/2005   | 2005/2006   | 2006/2007   | 2007/2008   |
|-------------------------------------|-------------|-------------|-------------|-------------|-------------|
| Agriculture                         | 58.1        | 58.5        | 59.0        | 59.3        | 60          |
| Waste evaporation from Nile &Canals | 2.1         | 2.1         | 2.1         | 2.1         | 2.1         |
| Drinking and Healthy uses           | 5.6         | 5.8         | 6.1         | 6.5         | 6.6         |
| Industry                            | 1.1         | 1.15        | 1.15        | 1.15        | 1.2         |
| River navigation                    | 0.2         | 0.2         | 0.2         | 0.2         | 0.2         |
| <b>Total</b>                        | <b>67.1</b> | <b>67.8</b> | <b>68.6</b> | <b>69.3</b> | <b>70.1</b> |

Source : Ministry of Water Resources &Irrigation

**Fig(2) Distribution of Egypt water Uses(05/06-2008/2009)**



### 3. Spatial Analysis of Access to Safe Water in Egypt

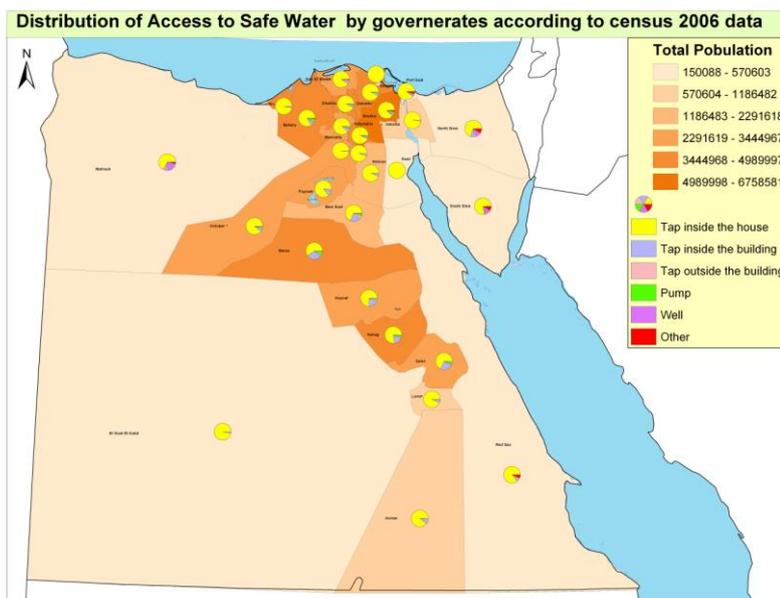
We use the Census 2006 geodatabase which contains maps of Egypt in different scales 3 level of administrative boundaries & Buildings level, we use also graduated colored to represent total population which is classified into 5 classes using natural break (Jenks) method ,then we use chart graph to represent the relative percentage of amount of households that use different sources of water supply .We use these previous methods in 3 levels of administrative boundaries then we use categorize method in Buildings level.

**As Follows:**

#### 3.1 Governorates level

We can Notice from Fig(3) from charts, that most of households in governorates have a Tap inside the house & inside the building .In some Governorates in Upper Egypt ,Sinai and West Sahara they use pumps and wells too.

**Fig(3) Distribution of access to safe water sources by governorates**

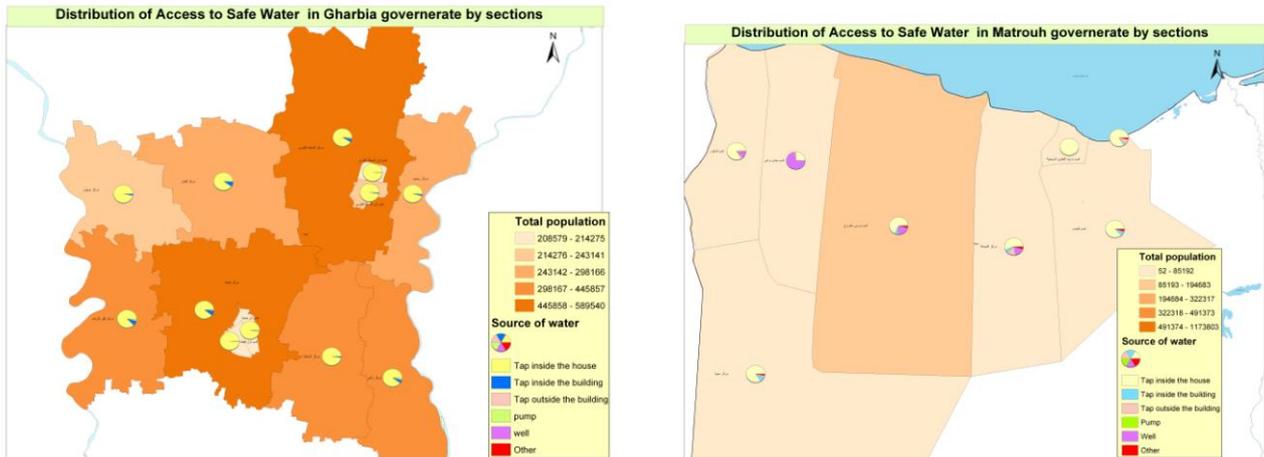


Source: CAPMAS GIS department.

### 3.2 Sections and cities level

We can See from charts in Fig(4), that most of households in Gharbia governorate sections have a Tap inside the house &inside the building .But in Matruh Governorate sections which have minimum population in West Sahara some of them use wells.

**Fig(4)Distribution of access to safe water sources by sections in Gharbia and Matruh Governerates**

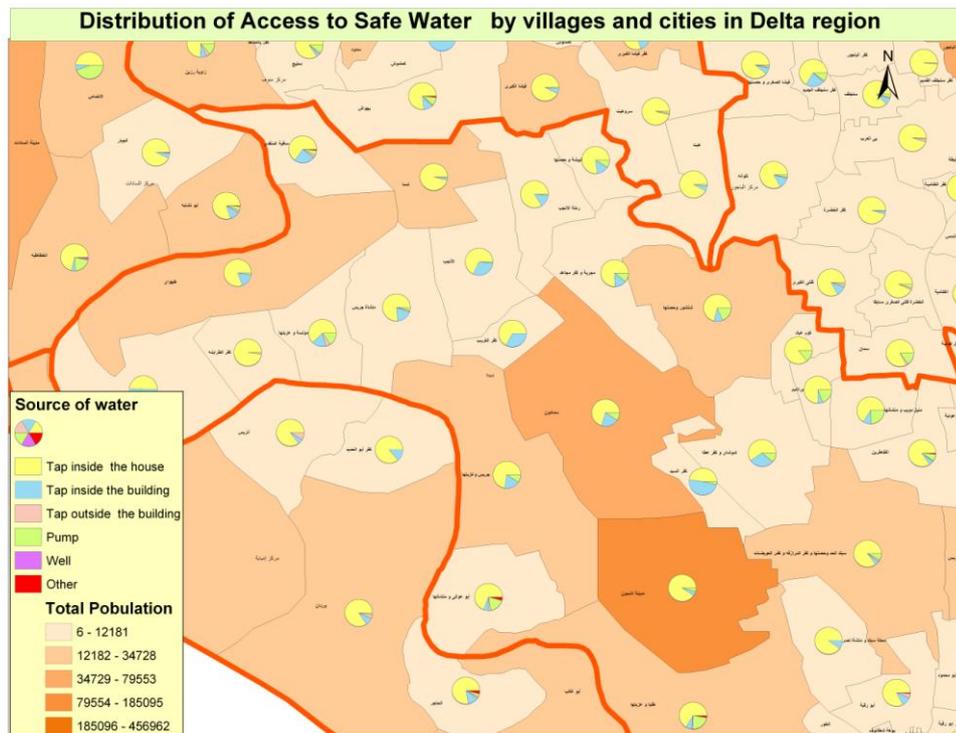


Source: CAPMAS GIS department

### 3.3 Subsections and Villages level

We can See from charts in Fig(5), that most of households in Delta region Subsections and Villages have a Tap inside the house &inside the building .But in Upper Egypt they also use pumps as seen from Fig(6).

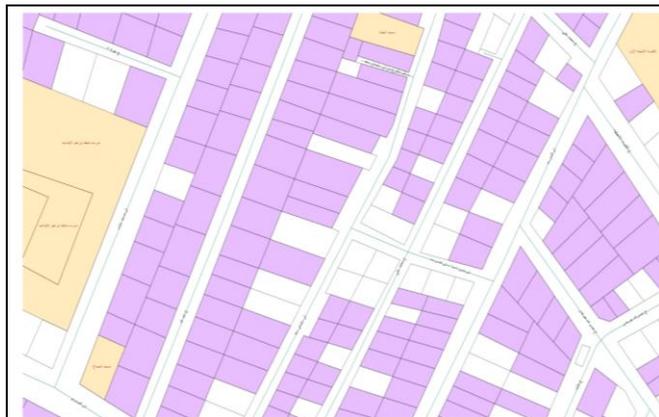
**Fig(5)Distribution of access to safe water sources by Subsections and Villages in Delta region**



Source: CAPMAS GIS department



**Fig(8)Distribution of access to safe water by buildings in Asut city.**



**Source: CAPMAS GIS department**

## **REFERENCES (RÉFÉRENCES)**

**CAPMAS Census 2006 Data**  
**Ministry of Water Resources & Irrigation**

## **RÉSUMÉ (ABSTRACT) — optional**

*Mrs Eman Orieby was born in Tanta, Egypt in 1971. She has a bachelor degree in Computer Science and automatic control engineering from Alexandria university in 1994. After graduation she joined Central Agency for Public Mobilization and Statistics (CAPMAS) In February 1995 at GIS department. She has taken advanced courses in GIS from Esri and advanced statistical courses from CAPMAS. She holds now the position as a director of GIS Gharbia office. She worked in several GIS projects which the most important of them are Census 2006 project and Health Care project. She has a scholar ship from EPHE Sorbonne and Lyon 1 University to have inter diploma in spatial analysis. She is a member of United Nations Group of Experts in Geographical names (UNGEGN) and was honored in May 2009 as a winner of UNGEGN African Essay Poem contest in 25th session of UNGEGN that was hold in Nairobi (<http://unstats.un.org/unsd/geoinfo/Essay-poem-contest-africa2009.htm>) . She participated in various international and national activities related to GIS, geographical names, sustainable environment, statistics.*

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