The European Union's European Neighbourhood Instrument
Water Sector Reform Programme - Phase II (WSRP-II), EGYPT

Technical Assistance to the Holding Company for Water and Wastewater for Technical Studies and Strategy Development
Component 3 – Updating the National Rural Sanitation Strategy

Rural Sanitation Strategy update

Ahmed Gaber

October 26, 2016

This project is funded by the European Union.

A project implemented by the consortium of: WS Atkins International (lead), Chemonics Egypt, COWI, and HCL Consultants.

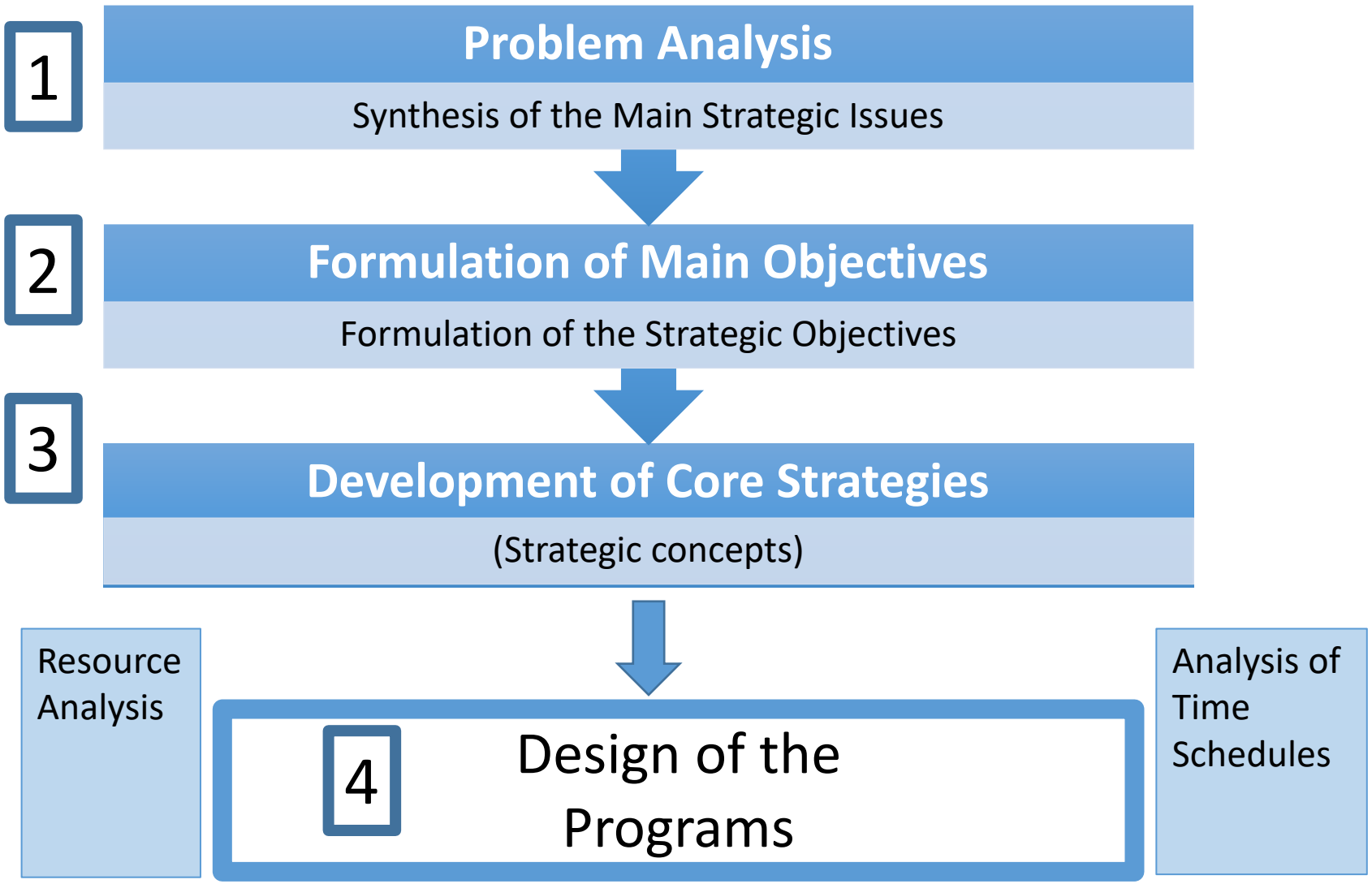
Outline

- The Process of Strategy Development
- Rural Sanitation in Egypt: Problem Analysis and the strategic issues
- Formulation of Objectives
- Formulation of Core Strategies
- Introduction to Rural Sanitation Programs

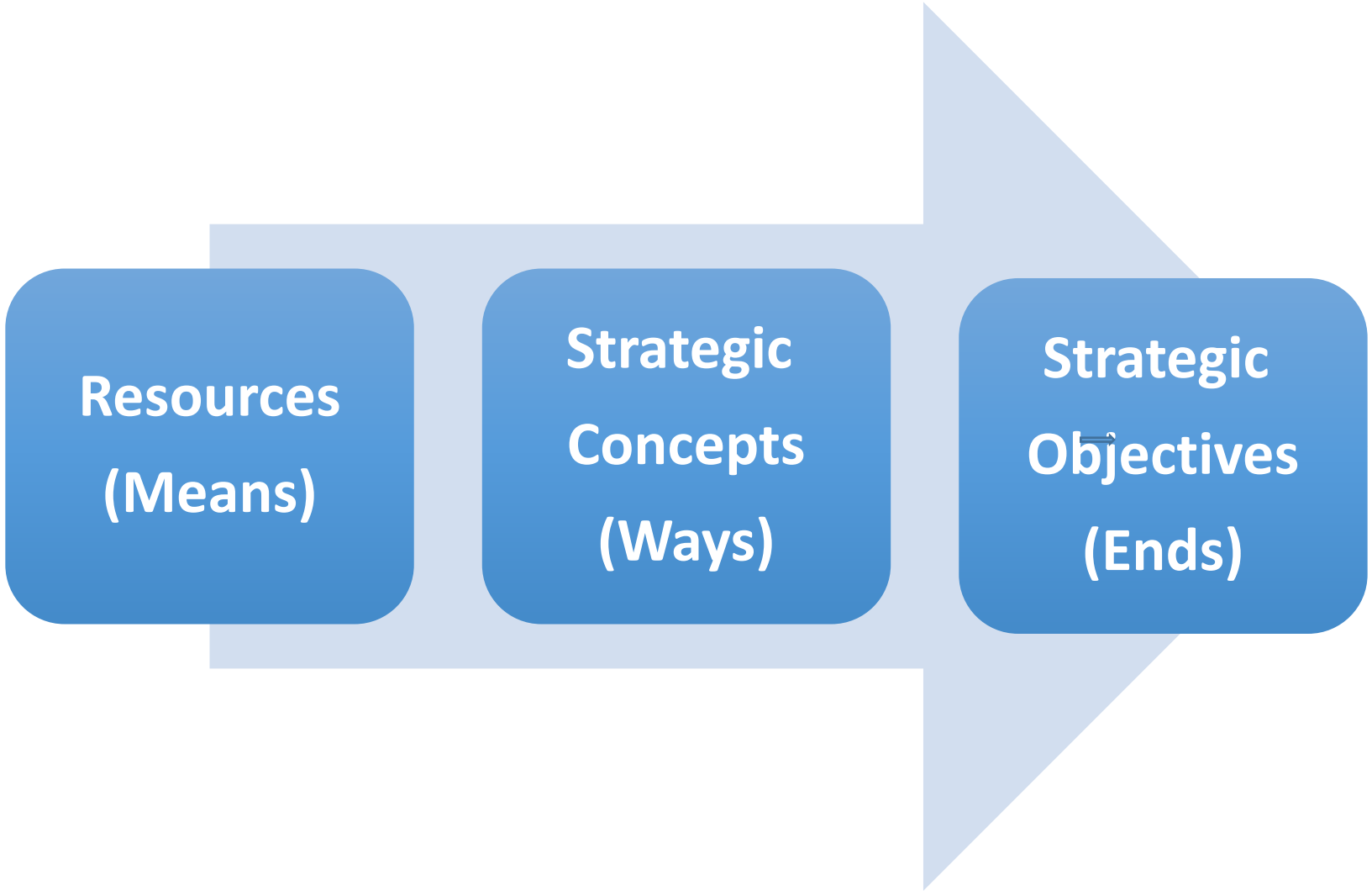
Outline

- The Process of Strategy Development
- Rural Sanitation in Egypt: Problem Analysis
- Formulation of Objectives
- **Formulation of Core Strategies**
- Design of Rural Sanitation Programs

The Process of Strategy Development

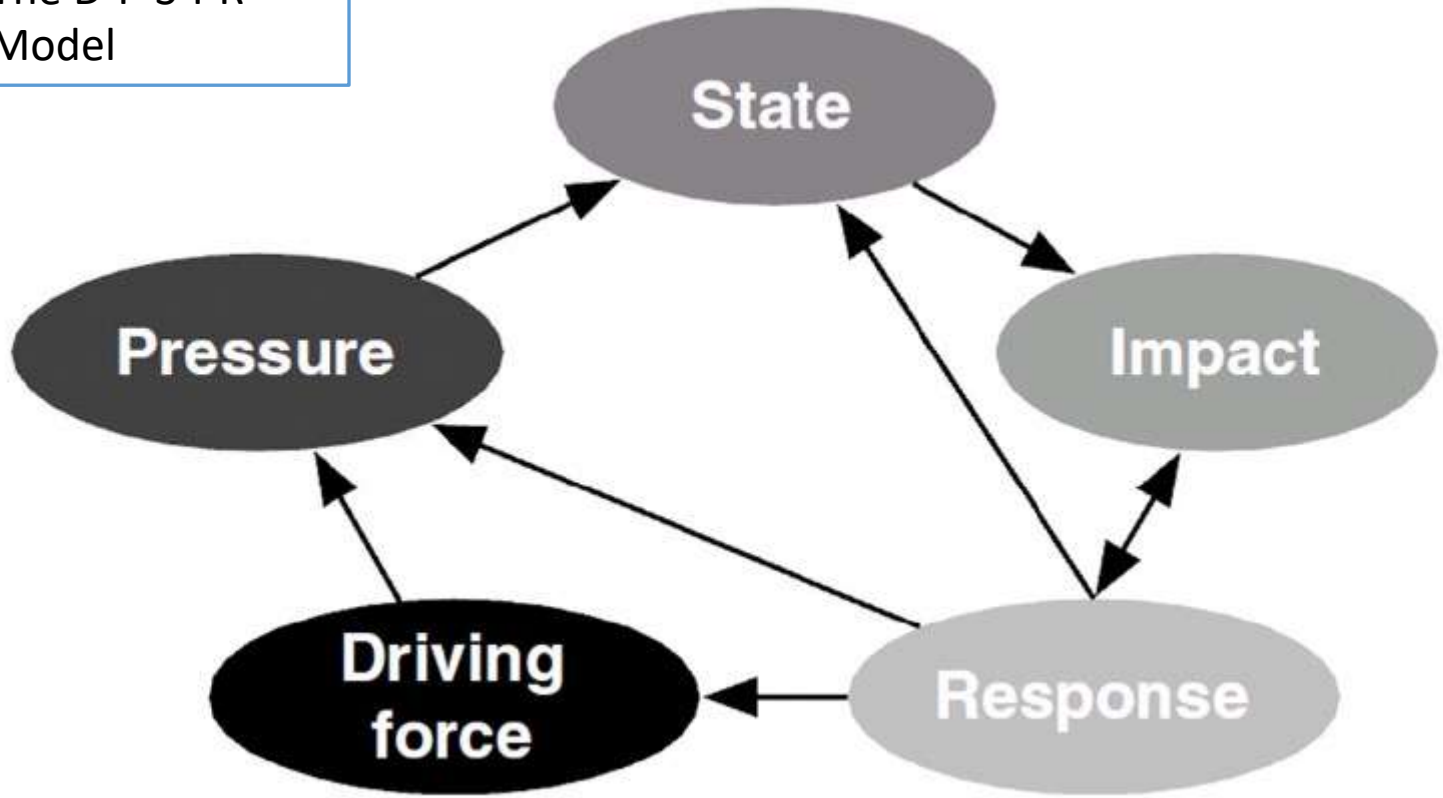


Strategy Main Blocks



1 Rural Sanitation in Egypt: Problem Analysis

The D-P-S-I-R Model



Strategic Issues (SIs)

Strategic Issue 1	**Water scarcity and deteriorating quality of surface and groundwater**
Strategic Issue 2	Rural solid waste management: Redefining sanitation services
Strategic Issue 3	Equality of opportunity: Reducing inter-governorate and regional coverage gaps
Strategic Issue 4	The current village-based model is not built for delivering service at scale
Strategic Issue 5	Poorly functioning sanitation infrastructure and noncompliance with environmental regulations
Strategic Issue 6	The demarcation of settlements to be served by sewerage systems
Strategic Issue 7	Incentivizing house connections to sewer networks and participating in FSM
Strategic Issue 8	Low levels of environmental awareness and unsafe practices
Strategic Issue 9	Stagnating child health indicators
Strategic Issue 10	Deepening poverty_____(Sawsan, need to rethink the title)
Strategic Issue 11	Dynamic rural contextual transformations
Strategic Issue 12	Population growth uncertainty – high population growth rates Population related concerns
Strategic Issue 13	The cost of environmental degradation
Strategic Issue 14	Rural Sanitation is not planned and managed as a Mega Program
Strategic Issue 15	Resource Uncertainties and Time scheduling

SI1 : Water scarcity and deteriorating quality of surface and groundwater

The immediate contact of the dense and the dynamic system of human settlements with agricultural land and water resources greatly impacts on the quality of scarce water resources.

- Canals and drains are present within the built up area of 86.2 % of villages
- In Rural Egypt, wastewater is discharged – with or without treatment – to agricultural drains and sometimes canals which further accentuates pollution loads along with agricultural and industrial wastewater, not to mention solid waste
- The problem of wastewater discharge extends from the household level to the hydrological basin level (Water Shed Cluster Approach)

Cont'd : Water scarcity and deteriorating quality of surface and groundwater

Surface water pollution

The level of water pollution in agricultural drains in some areas reached limits preventing the reuse of this water after mixing it with canal water, which is considered a serious waste of an important water resource

Region	Drain	Estuary	Length, km	Number of sub-drains pour on it	Governerates that the drain and its branches run through	Drainage design, Billion m³/year
East Delta	Alssaru Aleumumi	Manzala lake	46.049	16	Dakahlia - Damietta	1.212
	Bahr Albaqar	Manzala lake	106.499	16	Sharqia - Port Said - Qalyubia - Cairo	5.81
	Bahr Hadus	Manzala lake	69.25	10	Dakahlia	3.556
Canal and Sinai	Mahsama	Timsah lake	38.4	4	Ismailia	0.722
Middle Delta	Gharbia	Mediterranean sea	69	7	Gharbia -Kafr-el-Sheikh - Dakahlia	2.239
	Omar-Bek	Nile river-Damietta branch	8.75	10	Monufia - Gharbia	0.265
	Tala	Nile river-Rosetta branch	39.57	11	Monufia	24.13
	Sabal	Nile river-Rosetta branch	2.4	2	Monufia	26.6
West Delta	Al-Eumum	Mediterranean sea	40.3	8	Beheira - Alexandria	3.217
	Edku	Edku lake	48.8	10	Beheira	2.964
	West Nubaria	Mediterranean sea	68.4	11	Beheira - Alexandria	1.987
Middle Egypt	Al-bats	Qaroun Lake	50.848	19	Faiyum	0.749
	Al-Wadi	Qaroun Lake	35.3	11	Faiyum	0.425
	Muhit Atsa	Nile river	46.53	13	Minya	0.607
	El-Rahawy	Nile river-Rosetta branch	3.9	6	Giza	36.24
Upper Egypt	Albaria	Nile river	4	1	Aswan	0.013
	Al-Ssayl	Nile river	8		Aswan	70

Mixing station feeding Khadrawiya drain to Al Abbassa main canal

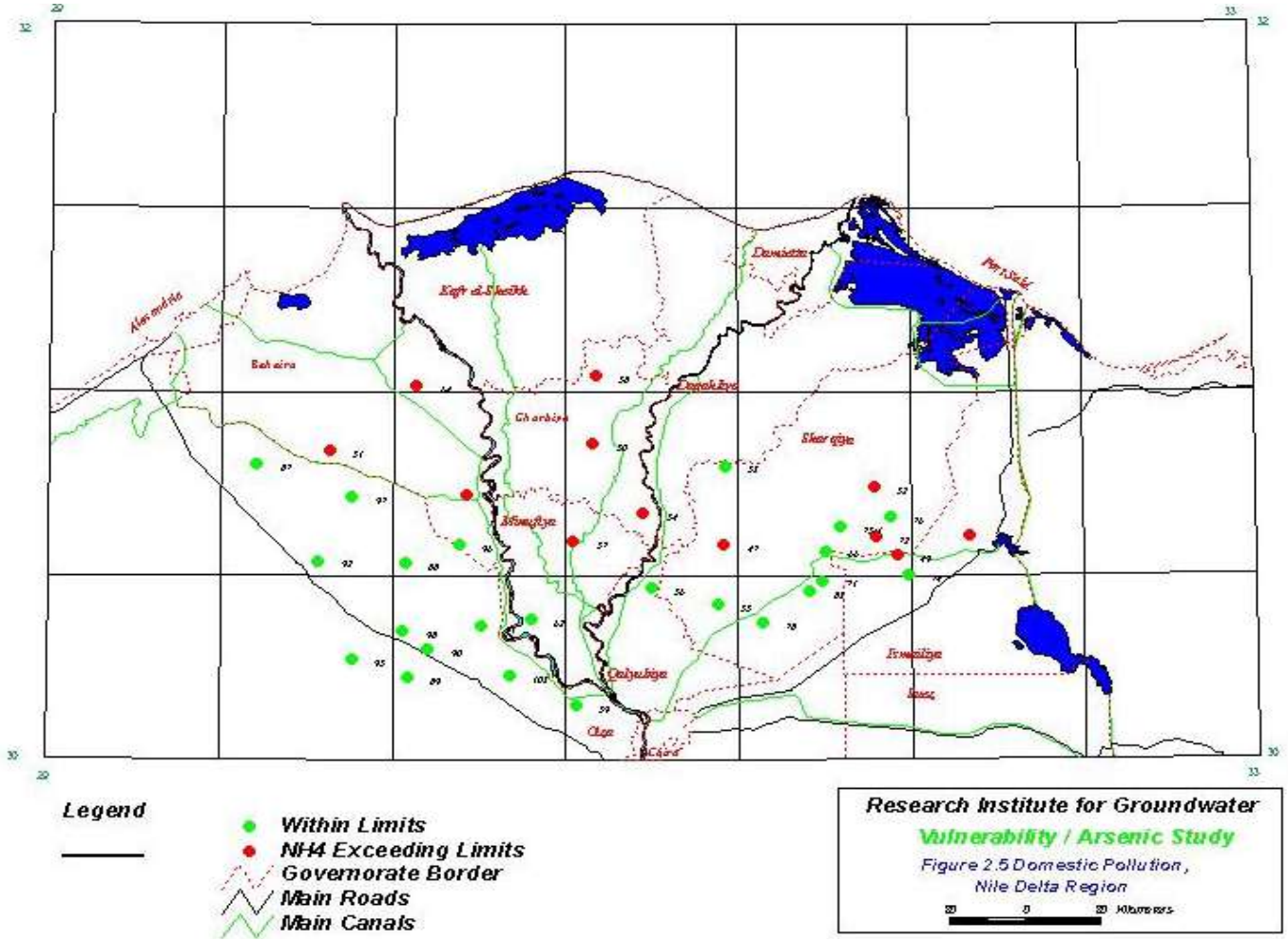
According to a survey carried out in Beheira, 25 % of households stated that they dispose their domestic wastewater directly in to the agricultural drains, while 44 % of HHs in Kafr El Sheikh reported that they dispose their wastewater directly in to the canal (WB report)

Cont'd: Water scarcity and deteriorating quality of surface and groundwater

Ground Water Pollution

The spatio-temporal heterogeneity of the shallow groundwater systems poses challenges for their effective long-term sustainability and proactive management. This heterogeneity results from the cumulative effects of a number of variables that may be impossible to isolate and study individually. These are the hydrometeorology, topography, drainage system efficiency, anthropogenic activities, land use, and associated chemical concentration in the topsoil, net vertical recharge (affected by leaching rainfall), local depth to groundwater, lateral recharge from ground or surface water sources, and the associated impacts.

Source: Masoud,A.A. (2013)



Ground water pollution due to domestic wastes, Delta region- Egypt

SI2 : Rural solid waste management: Redefining sanitation services

If SW is properly used, it can be a valuable resource, but if it is not effectively managed, it can result in serious adverse impacts on the environment and public health

The lack of an efficient system for SWM drives residents to dispose solid waste into drains and canals.

SW does not only contribute to surface water pollution, greenhouse gases emitted from SW dumpsites have a global warming effect and if improperly managed, leachate can cause groundwater pollution (Mohapatra 2010)

According to CAPMAS Survey 2015

- 71 % of villages with canals & drains suffer from SW,
- Drains and canals in 44 % of villages have dead animals
- in 51 % of villages, SW is collected from houses
- HHs in 17.4 % of villages dispose SW in streets
- HHs in 12.5 % of villages dispose SW in water ways
- HHs in 12 % of villages burn SW

For the provision of sanitation services to significantly decrease water pollution, degradation of the environment or incidences of water related-diseases, it must incorporate SWM solutions. **SWM is therefore a critical component without which the positive effects and benefits of providing sanitation to unserved communities will not be realised.**

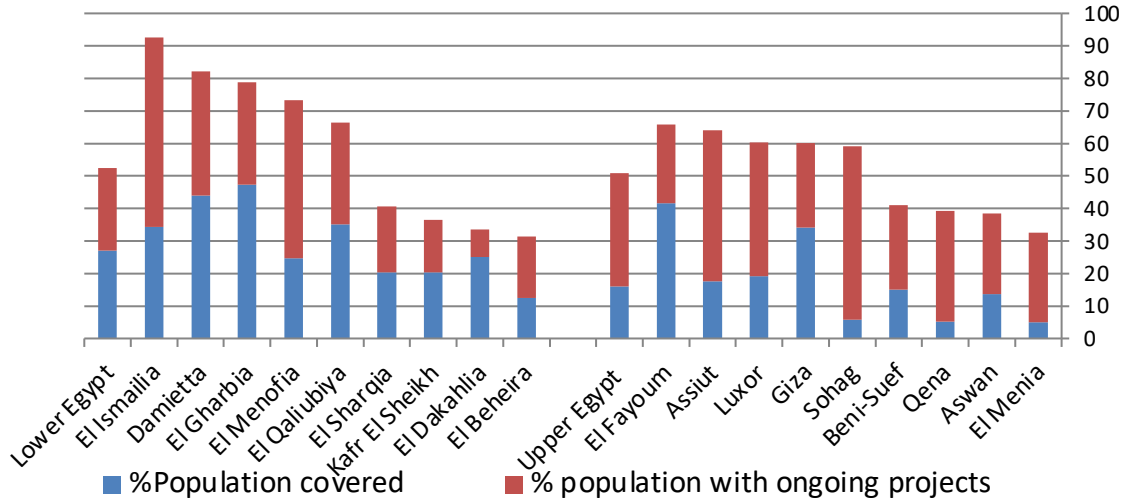
SI3 : Equality of opportunity: Reducing inter-Governorate and regional coverage gaps

- The Sector is committed to reducing regional disparities through the equitable distribution of allocated investments to all.
- With the completion of on-going projects, the regional gap will be eliminated with both Upper and Lower Egypt having almost equal coverage (about 50 %) .
- Inter-governorate variations in coverage rate, however, remain large.

Summary of the status of population coverage in rural Egypt

Classification	Type of villages	Number of villages	Population 2015 ('000)	Inhabitants as a percentage of total rural population
1	Villages served by sanitation system	609	10,870	21.6
2	Villages with on-going projects	1,015	14,950	29.73
3	Villages with gravitational sewers	444	3,527	7
4	Villages not covered ms	2,698	20,926	41.62
	Total	**4,766**	**50,273**	**100%**

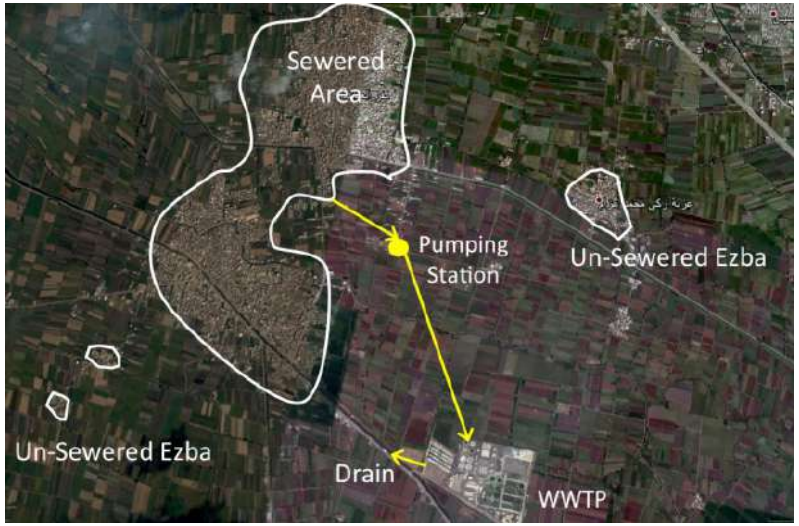
Percentage population covered in 2015 and expected to be covered with the completion of on-going projects



SI4 : The current village-based model not built for delivering service at scale

The current delivery model is village based

- Assumes that the Egyptian village is static and not undergoing major contextual and compositional transformations, all of which have a great impact on the environment.
- Focuses on wastewater management coverage through the provision of sanitation infrastructure at the village level, while nearby small rural settlements , remain un-served.



The delivery process is complex and not built to deliver services at scale.

- It has limited institutional capacity and is far from financial sustainability due to low tariffs.
- It suffers from over complicated project design with overlapping responsibilities and unclear accountabilities and authority.
- It favours the large national organizations and a separation of infrastructure investment, construction, and rehabilitation from management, operation, and maintenance of the systems**.**
- considerable risks of delay, inadequate quality of works, due to poor supervision of contractors and consultants and poor design, and relatively expensive infrastructure compared to other countries.

SI5: Poorly functioning sanitation infrastructure and non compliance with environmental regulations

The poor performance of the Sector is due to:

- Tension between central implementation yet decentralized operation.
- Technical, social and design complexities and uncertainties and social conflict
- Inadequate capacity and poorly functioning sanitation infrastructure
  - *Poor Service Quality*
  - *Poor implementation of works*
  - *Poor operation and maintenance*
  - *Unhealthy assets (lack of assest management)*
  - *Non compliance with environmental regulations*
  - *Poor response to grievances*

Design Uncertainties

The targeted population within the built up area (after 30 years) is projected based on a certain population growth rate; sewer networks are designed assuming that all streets wider than a certain width will be covered; and gravity lines are designed to handle a future flow which is based on a certain per capita water consumption; and secondary WWTP are designed to comply with the stringent regulations of Law 48/1984.

It is highly unlikely that current water consumption levels will continue into the future without major measures to realize a reduction in potable water consumption and consequently wastewater generation.

SI6 :The demarcation of settlements to be served by sewerage systems

- In 2006, the rural settlement system included 34,147 settlements of which 26,404 rural settlements had a population less than 1000.
- There settlements accounted for 18 % of total rural population and 77.3 % of the total number of settlements; with an average population size of 281 persons.
- It is economically unfeasible to build treatment facilities in settlements with less than 1000 inhabitants in 2015 reaching less than 1400 inhabitants by 2037.
- **Accordingly, an effective FSM system, must be viewed as a viable option, as at least 10 million inhabitants will not be connected to sewer systems by the year 2037.**

Distribution of rural population (Adapted from the Central Agency for Public Mobilisation and Statistics, 2006)

Population size/community (status of sanitation coverage)	Number of communities	Population (2006)	Percentage of total rural population (%)
Greater than 10,000	738	(5,207,380)[1]	13%
Greater than 10,000		7,928,502	32%
Greater than 5,000	1,884	15,658,410	50%
Greater than 3,000	3,215	20,928,360	63%
Greater than 2,000	4,515	24,130,993	71%
Greater than 1,400	5,867	26,073,224	76%
Greater than 1,000	7,743	28,652,419	82%
Less than 1,000	**26,404**	**7,567,307**	**18%**
Total	**34,147**	**36,219,726**	**100%**

The graph and table reflecting costs and population size.

SI7 : Incentivizing house connections to sewer networks and participating in FSM

The current rate of the willingness of residents to connect to the newly laid sewer networks raises many concerns and uncertainties:

- Residents in villages with gravitational sewerage may believe they have already contributed financially to the program and may not be willing to pay for household connections to the new networks.
- Those who dug deep wells may also by be unwilling to pay for household connection to new sewer networks if targeted by the sewerage networks, or to participate in the septage management program if not targeted.
- Residents' momentum to connect to the network is high during the early stages of the project and falters as subsurface water levels in the built up area is reduced with the completion of networks and operation of PSs, which in turn reduces evacuation frequency.

Who should pay for house connections? Regulations clearly stipulate that residents must bear the cost of house connections in addition to properly filling their vaults according to specifications.

SI8: Low levels of environmental awareness and unsafe practices

Most of the threats to water sources and public health are caused by unsafe practices driven mainly by low levels of environmental and hygiene awareness

Unconnected Residents: The inconvenience and high cost of frequent vault evacuation levels has led un- connected residents:

- to build gravitational sewers in areas with high subsurface water
- to dispose vault contents directly into groundwater through deep wells seriously threatening groundwater sources.
- dispose sullage into streets creating breeding beds for insects.
- In some cases, residents have resorted to acute water deprivation practices reaching limits below WHO recommended per capita water use.

Connected Residents: Those connected to sewer networks lack the basic knowledge of how to use and maintain facilities. They may dispose children diapers, animal waste, etc., into sewer networks.

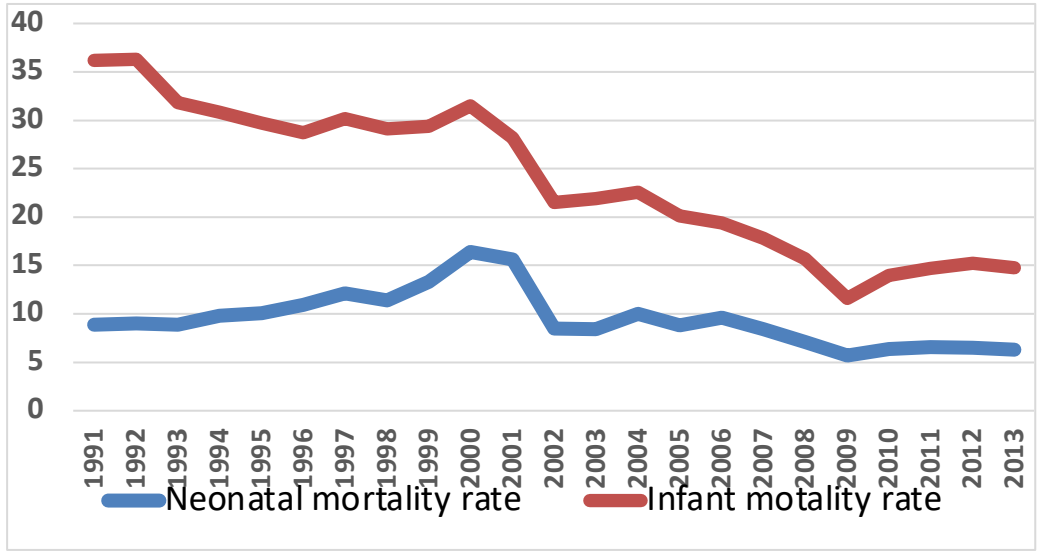
A recent survey of rural villages showed that three-quarters of Egyptian villages do not have sewerage systems (CAPMAS, 2016). Moreover, the sewerage systems in the 47.5% of villages were often blocked and not in working order, with about 3.8 % of them blocked on a daily basis.

SI9 : Stagnating child health indicators

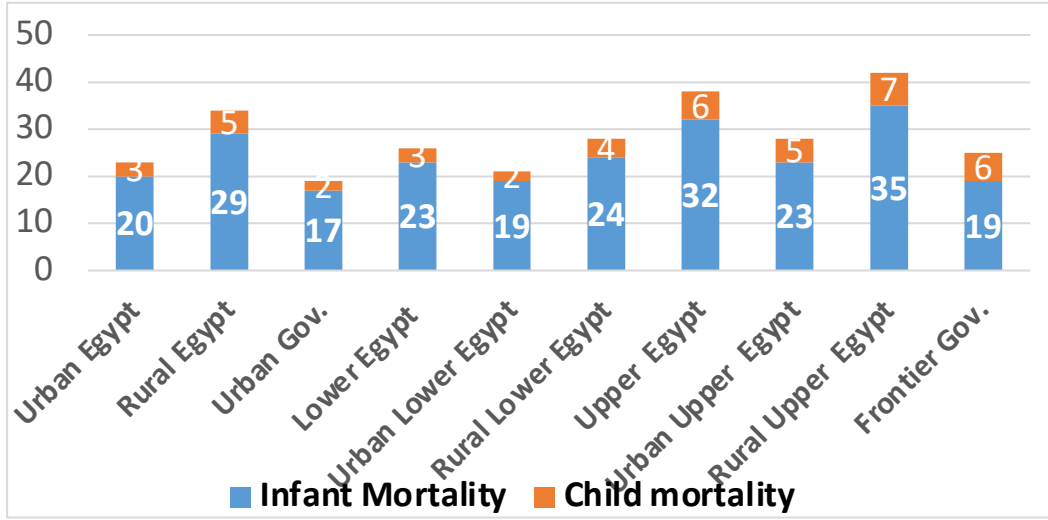
Lack of sanitation leads to disease. The diseases associated with poor sanitation are particularly correlated with poverty and infancy mortality and alone account for about 10% of global burden of disease (Pruss-Ustun, et al , 2008).

- There have been major improvements in both Neonatal and IMR over the 1992-2009 period. The trends over the 2009-2013 period shows relative stability.
- IMR and CMR are higher in Rural Egypt than in Urban Egypt and in rural upper Egypt compared to rural lower Egypt .
- The prevalence of diarrhea in children (> 5 years) is highest in Rural Lower Egypt and amongst the poorest 25 % of Egypt population. The situation is particularly critical in villages along the Nile River and its many branches

Trends in Neonatal and Infant Mortality Rate (CAPMAS)



Regional variations in IMR and CMR 2012 (Zanati 2014)

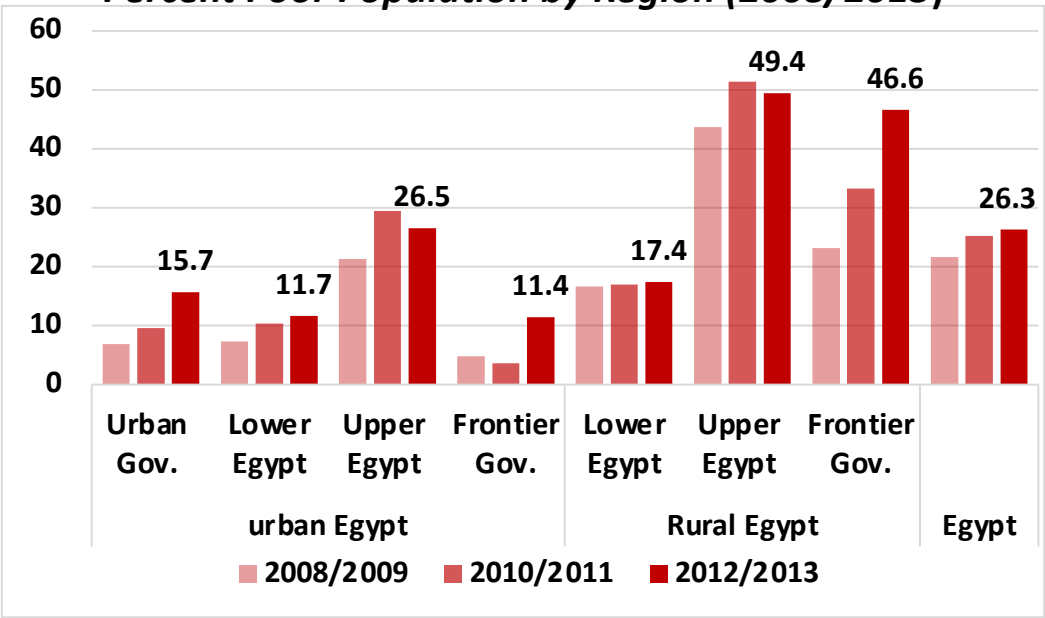


SI10 : Deepening poverty

The current delivery model divides the population into two groups: those connected who pay for house connections and service charges and those un-connected who pay for vault evacuation charges.

With deepening poverty, the high cost of vault evacuation clearly represents a major financial burden on poor rural residents.

Percent Poor Population by Region (2008/2013)



The rural poor in Lower Egypt pay monthly costs up to eight times the amount that is paid by Egypt's wealthiest communities that enjoy direct access to public sanitation networks and up to twice the amount the rural communities in Upper Egypt pay to empty their septic tanks. (**world bank report**)

- **Steady increase in % poor population reaching about 50 % in Upper Egypt.**
- **About 9.2 million children (age 0-17 years) live in material poverty, of which more than half are in upper Egypt's governorates**
- **About 7.5 million children living between the upper and lower poverty lines are exposed to poverty**
- *Source CAPMAS Poverty Report 2015*

SI11: Dynamic rural contextual transformations

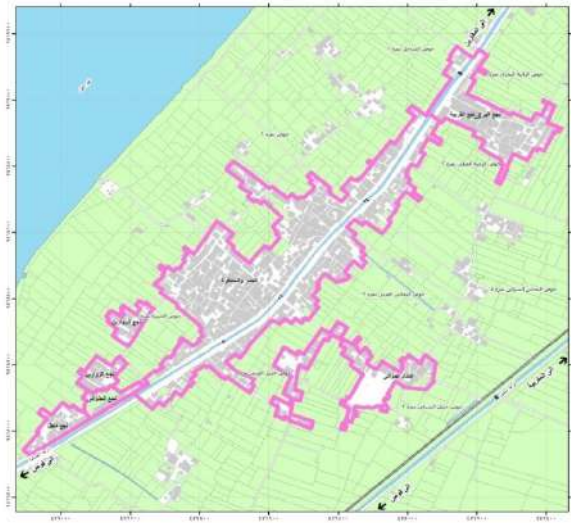
Land use shifts and Loss of Agricultural land

- Land uses change 1984-2007 indicates that agricultural land increased by 19.7 % while human settlements increased by 132.5 %.
- In the Delta, the area of human settlements almost doubled and resulted in the absolute loss of about 300Feddan of agricultural land.
- Most of the lands added to agricultural land during the 1984-2007 have been in land reclamation lands East and West of the Delta.

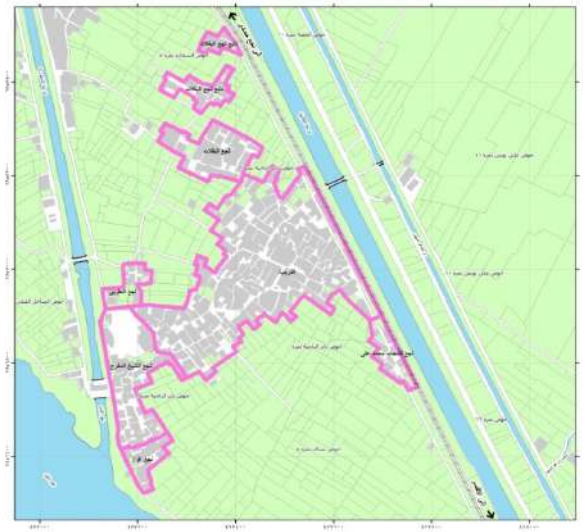
cont’d: Dynamic rural contextual transformations

The Merging of Villages and Ezab

Urban growth has led to the expansion of cities and nearby villages and Ezab and the formation of complex urban forms that contain both urban and rural settlements.
Similarly, many rural settlements (villages and Ezab) have merged.
Rural settlements are also expanding both horizontally and vertically in response to population growth, leading to higher population densities.



Homr and Gaafra Heiz includes 5 Naga (4 are merged)



Al Mafragia Heiz includes 7 Naga (5 are merged

cont'd: Dynamic rural contextual transformations

Changes in Land Uses and Housing typology

With increased education, mobility, access to potable water supply, consumption patterns have changed leading to major transformation in land uses and housing typology (i.e., mud brick buildings are being replaced by multi storey buildings). Very high quality buildings show that Egyptians working abroad have directed their savings to their villages.

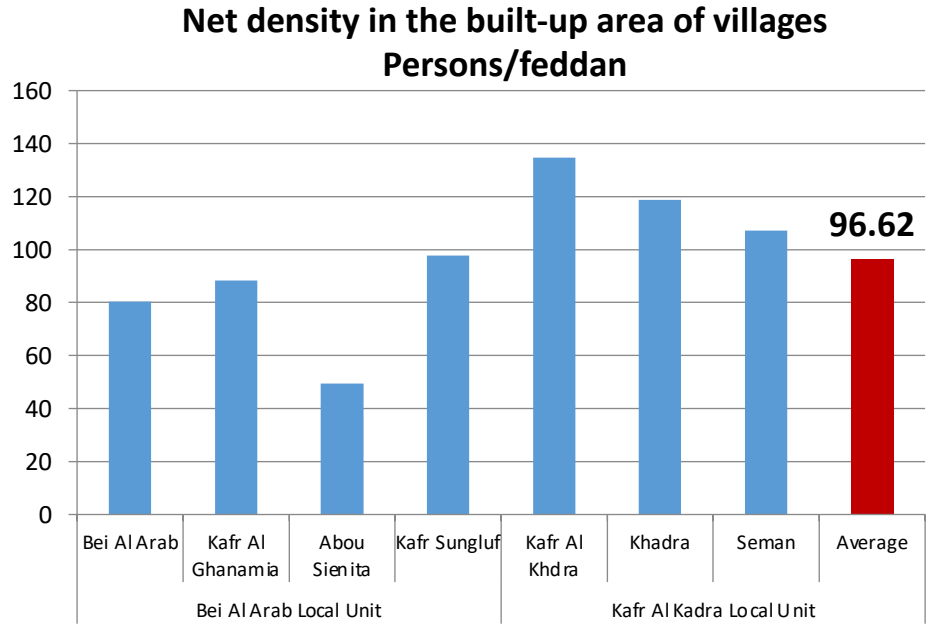
Poor Road Conditions

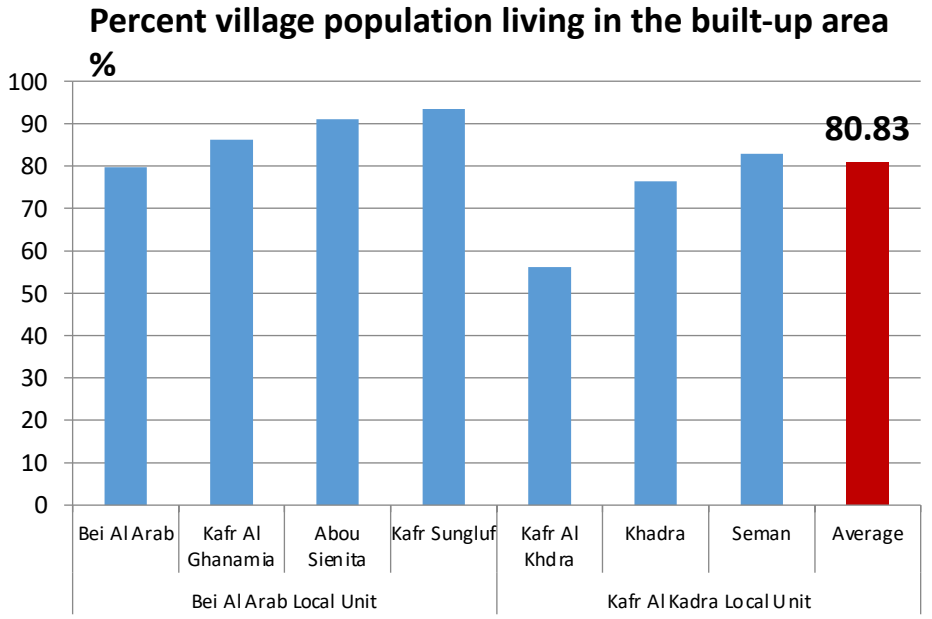
Most rural settlements suffer from poor condition of the local road network, which is mostly narrow and unpaved.

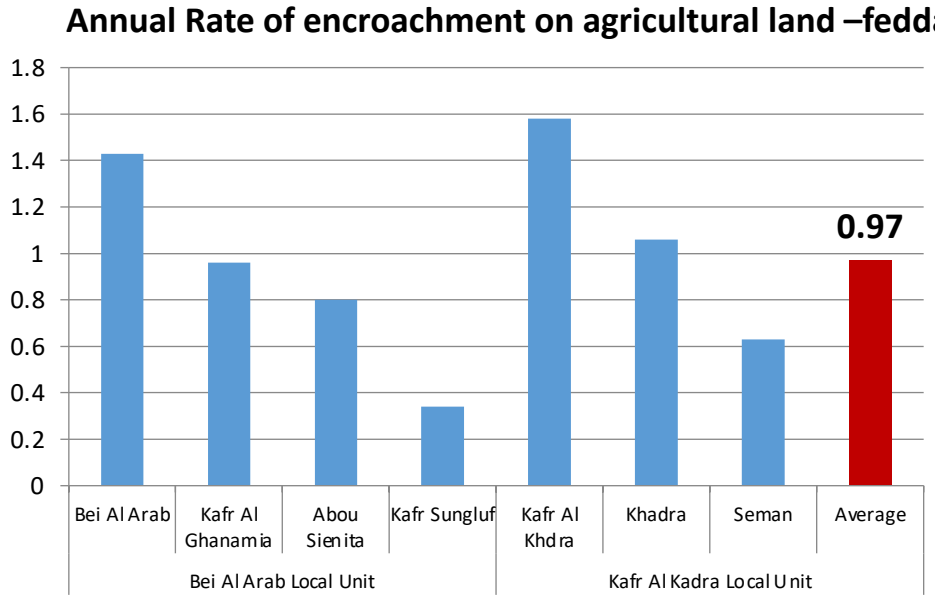
Justifiably, the rural population are voicing higher expectations from the State to extend improved water and sanitation services.

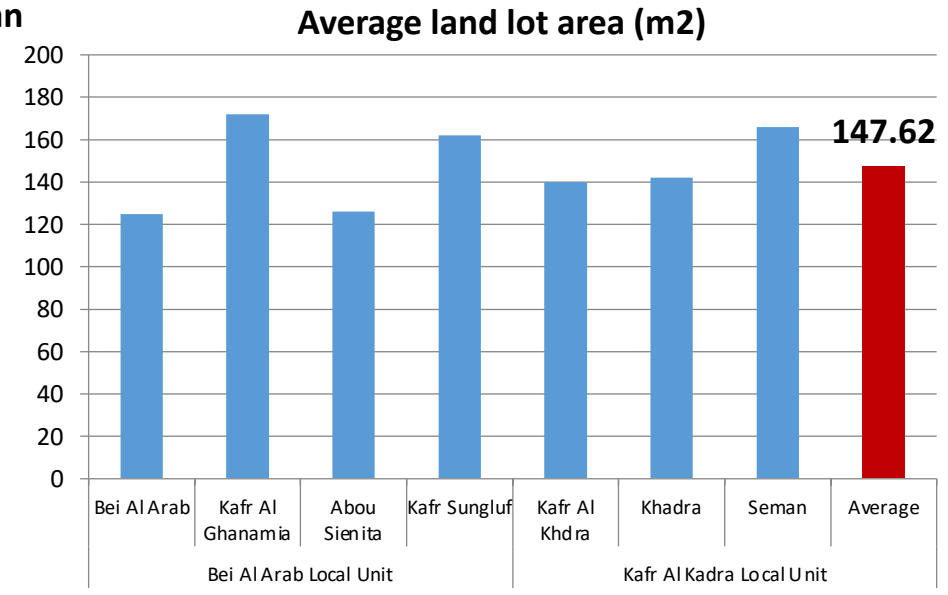
The ongoing process of replacing mud buildings with skeleton structures

Cont'd. Contextual Transformation: Urban characteristics of rural areas







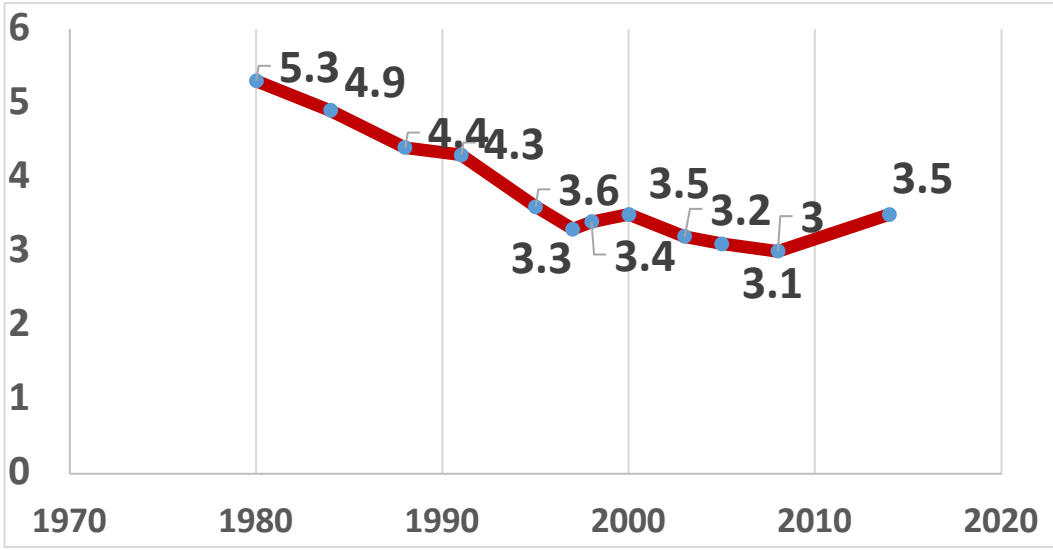


SI12: Population growth uncertainty – high population growth rates

- Population growth rates have increased since 2006 due to a reversal in the trend of fertility rates back to 2000 (3.5 births per women), with very high fertility rate in Rural Upper Egypt which already has 50 % of the 22 million poor Egyptians reported in 2012/2013.
- The Rural population is growing at a higher rate than urban areas, and has maintained its share of total population for the last 30 years reaching 57 % in 2015.
- Rural Egypt has a population of 50.4 million in 2015.

The unexpected reversal in fertility rates not only makes population projections uncertain but will accentuate poverty even further

Trends in Fertility rates 1980-2010



Population Growth Rates

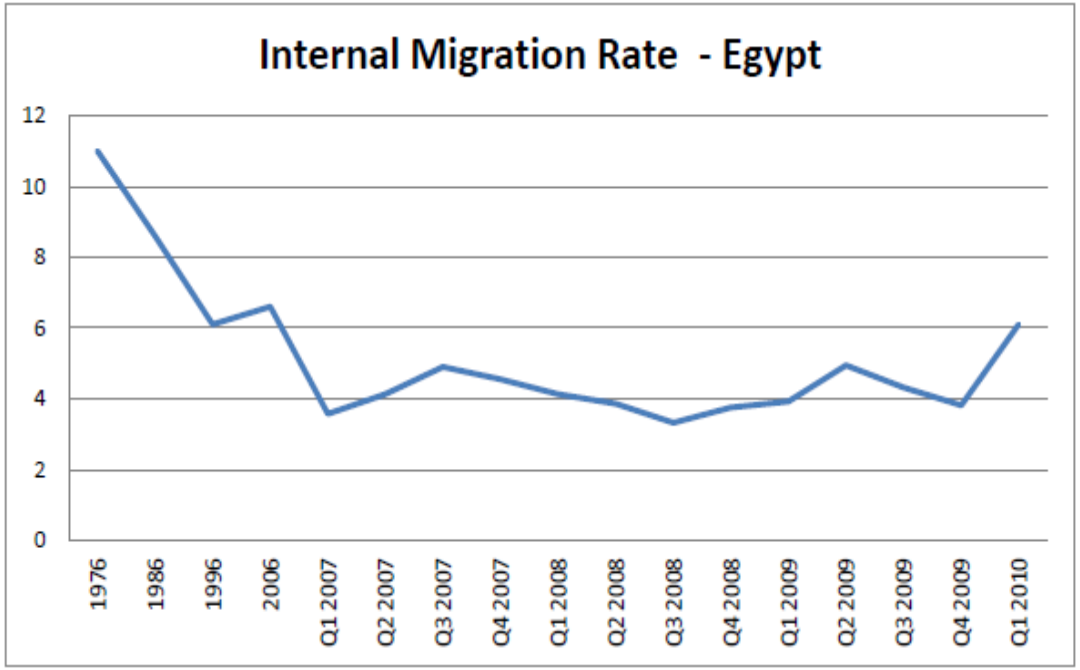
	Annual population growth rate (%)			
	1986/ 1996	1996/ 2006	2006/ 2014	2014/ 2015
Urban	1.97	1.91	1.98	2.43
Rural	2.25	2.02	2.15	2.62
Total	2.13	1.98	2.07	2.54
% Urban	43.7	42.6	42.3	42.77

Census Population 1882-2006 and 2015 estimate (000)

Cont'd: Population growth uncertainty – low migration rates

Internal Migration

The slowing down of internal migration– which is low according to international standards- partially explains Rural Egypt's stable share of population over the last 30 years.



Source: Figure 1 in Herrera and Badr (2012)

Three interrelated explanations for low migration rates :

1) low educational level;
2) labor tied up in agricultural activity either as paid labor or unpaid family workers; and
3) rural households' ability to raise a portion of their food reduces the incentive to migrate.

- With slowing down of rural-urban migration and increasing rural population growth rates, it is uncertain that Rural Areas' share of Egypt's population in 2037 will decline from 57 % to 40 %.
- This growth will put even greater pressure on already scarce water resources and agricultural land seriously threatening Egypt's Food security.

cont'd: Population growth uncertainty – carrying capacity

- A study estimated the total carrying capacity of rural areas in 2010 at 39.4 million. Rural Egypt has already surpassed this carrying capacity reaching about 49.1 million in 2014.
- If we assume stable share of rural population, then rural Egypt will have a population ranging from 87 to 104 million by the year 2052.

CAPMAS Population Estimate (three alternatives) up to the year 2037

Alternatives	2012	2017	2022	2027	2032	2037	2052	Rural Population in 2052
Alternative 1 (1.5 % annual growth rate)	**81.8**	**89.7**	**106.5**	**110.81**	**115.3**	**123.7**	**152.9**	87.2
Alternative 2 (1.7% annual growth rate	**82**	**89.6**	**107.8**	**113.31**	**119.1**	**129.0**	**163.8**	93.4
Alternative 3 (2.04 % annual growth rate	**82.3**	**90.7**	**110.9**	**116.65**	**122.7**	**132.9**	**183.8**	104.8

"…carrying capacity is determined jointly by human choices and natural constraints. Consequently, the question, how many people can the Earth support, does not have a single numerical answer, now or ever. Human choices about the Earth's human carrying capacity are constrained by facts of nature which we understand poorly. So any estimates of human carrying capacity are only conditional on future human choices and natural events." Joel Cohen 1994

Carrying Capacity of Rural Villages up to the year 2000

According to a study by the Faculty of Urban Planning, CU (2000), rural population was expected to reach 47.8 million by the year 2010 (high because based on 1976/1986 growth rates), it has however reached (44.488 according to WB), and 44.895 million according to the Census 2010).

The study estimated the land required ***to absorb population growth up to 2010 at 70.3 thousand acres which will be mostly agricultural land***. Total carrying capacity of rural areas is estimated at 39.4 million which means a surplus of 8.1 million that need to be redirected outside the Nile Valley and Delta. If villages more than 5000 inhabitants are included and replanned -according to their built-up area and maximum net density (150 persons/acre)- the population surplus increases to 11.9 million. As evident from population census, Rural Egypt has already surpassed this carrying capacity and reached about 49.1 million in January 2014, accounting for 57.23 % of Egypt's population.

Carrying capacity and population surplus in rural settlements according to village size

Item	Village population size (000)					
	less than 5	from 5-10	from 10-15	from 15-20	more than 20	average
population growth rate 76/86 %	1.9	2.1	2.7	2.8	2.9	2.4
population increase (1000)	4.9	11.5	24	32.5	51.4	124.3
urban expansion (acre/year)	0.38	0.8	1.3	1.3	1.9	1.2
population density - range	36-186	41-221	71-276	42-247	124-480	
average person/acre	82	113	153	165	215	137
carrying capacity (1000) present	6.8	10.3	14.2	18.3	21.4	
carrying capacity (1000) 2010	4.9	11.5	24	32.5	51.4	
surplus and shortage	1.9	-1.2	-9.8	-14.2	-30	39.7
population 2010 (million)	-3.8	-1.6	-4.8	-2.2	-3.3	-8.1

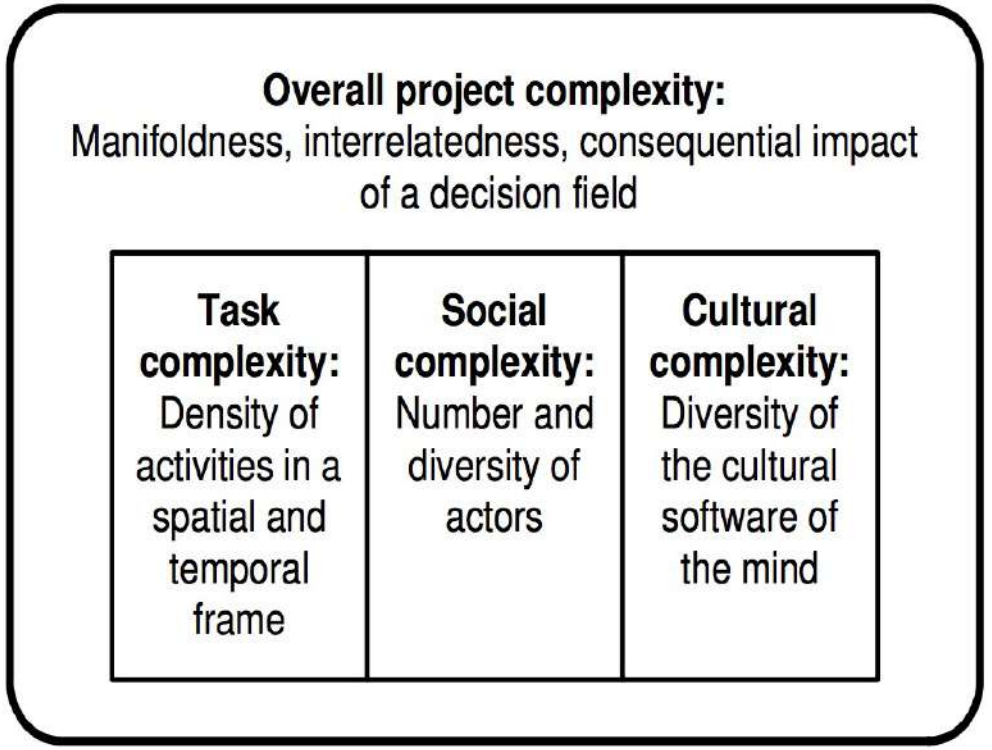
SI13: Rural Sanitation is not planned and managed as a Mega Program

The Rural Sanitation Challenge must be addressed as a Mega Program.

It has all the characteristics of Mega programs such as :

1) very large investments exceeding billion of dollars;
2) uncertainty due to their long term implementation schedule;
3) inclusion of many sub programs and project portfolios;
4) complexity including technical, social, cultural, organizational and institutional;
5) multi-stakeholders and interest groups; and
6) multi-sectoral and multi-functional.

Mega-project complexity



Cont'd: Mega programs Risks and corrective actions

Typical risks in mega-projects include

- Changes in project scope and requirements
- Overcoming regulatory concerns
- Design delays, errors and omissions
- Inadequately defined roles and responsibilities
- Insufficient skilled labour
- Financial stability of sub-contractors and suppliers
- Inadequate management experience
- Unstable relationships among project participants
- New technology or novel construction techniques
- Unfamiliarity with the local cultures or conditions
- Uncontrollable events/force majeure

The main recommended actions to deliver on the promise of mega-projects are :

- to carryout the engineering and risk analysis before starting construction
- streamline permitting and land acquisition
- Early formal risk management is crucial for mega-projects.
- to build a project team with the right mix of abilities.

Mega programs require the establishment of organizational structures responsible for program management.

2 Goals or Main objectives

Goal: Improving the public health of rural population and achieving safe environmental conditions within villages and water ways.

Main Objectives:

1. Increase coverage with rural sanitation infrastructure through household sewer connections and safe, accessible and affordable Bayara evacuation service.

2. Achieve major improvement in public and environmental health in villages, agriculture canals and drains.

3. Achieve major improvement in water quality in agriculture drains to reserve Egypt’s water resources for best ways of reuse.

Formulation of the Strategic Objectives (SOs)

SO1. Achieving 40% coverage of rural population with the first sanitation service level (SSL1), (time scale 1).

SO2. Upgrading the 40% coverage of the population initially covered by the first sanitation service level to the **second** sanitation service level (SSL2), (time scale 2).

SO3. Achieving the third sanitation service level (SSL3) to additional 30% of the population living in clusters selected on the national level by applying clusters prioritization criteria set up by this **strategy**, (time scale 3)

SO4. Achieving the fourth sanitation service level (SSL4) to additional 30% of the population living in the watersheds of **main** drains, to be selected on the national level by applying main-drain prioritization criteria set up by this strategy, (time scale 4)

3 Formulation of the core strategies

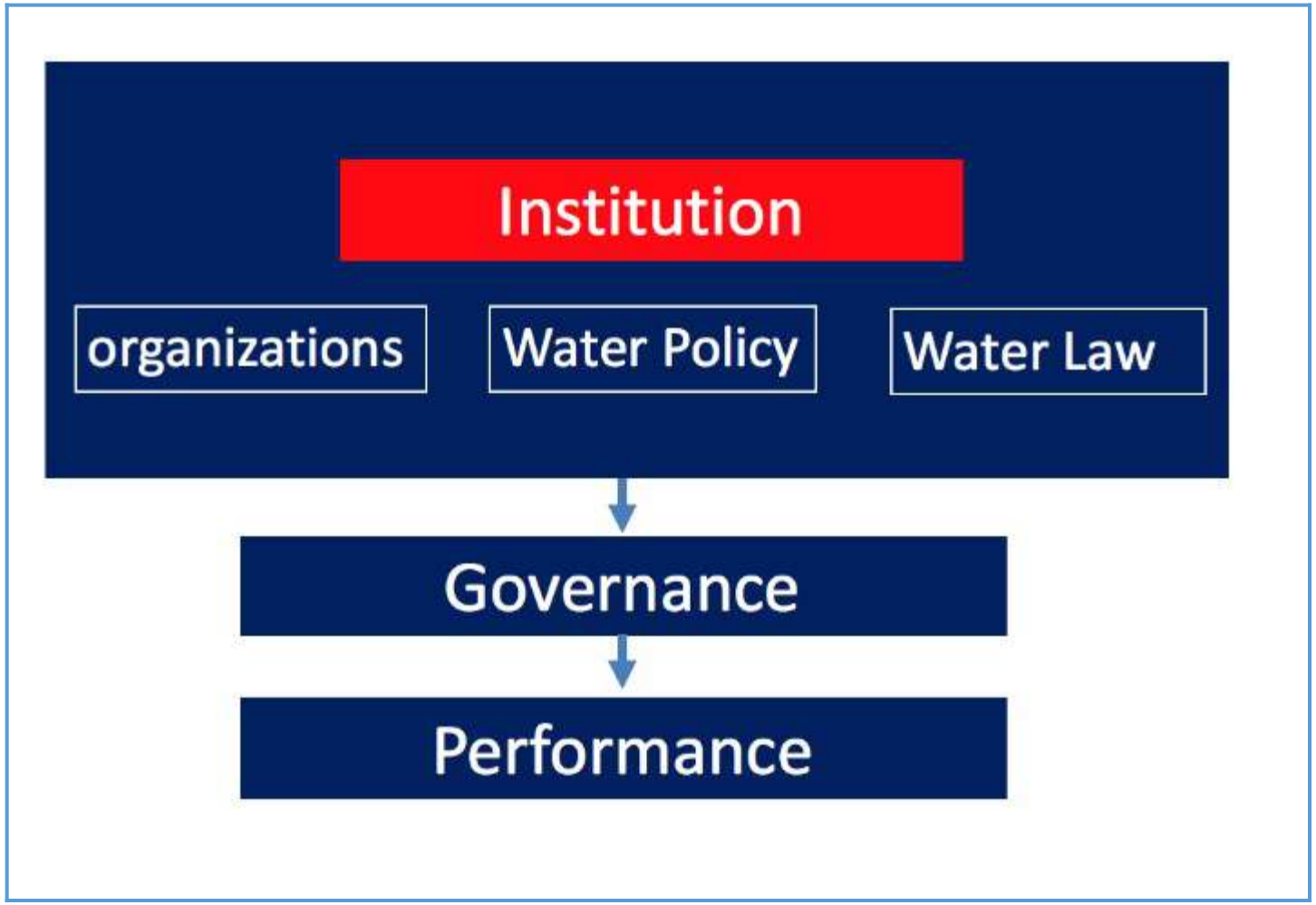
Core Strategy 1:	**Enabling the Process of Institutional Development and the Establishment of a New Governance Model**
Core Strategy 2:	**Enabling the Multi-Sectors and Multi-Stakeholders Approach**
Core Strategy 3:	**Progressive Multi-level Service Provision**
Core Strategy 4:	**Territorial and Functional Integration and Participatory Planning**
Core Strategy 5:	**Development of Technological Packages and Systems**
Core Strategy 6:	**Green Economy Focus Strategy**
Core Strategy 7:	**Maximizing the Potentials of Economies of Scale**

Core Strategy 1: Enabling the Process of Institutional Development and the Establishment of a New Governance Model

Means	Ways	Ends
Government focal unit mandated to lead the process of sector reform Specialized consultants	This strategy is aiming at improving the overall level of performance of the rural sanitation service delivery system. The strategy focus on "Governance" as the engine to performance improvement. According to this strategy, governance is an "institution" output. Institution is composed of three components: Water policy, Water law and organizations. This strategy calls for major changes in the three components based on in-depth analysis on the current situation, constraints and the magnitude of the task.	• Rural Sanitation organizations established on the national and local levels • Financial resources and financing mechanisms established • Human resources development and new management systems established • Capacity built to achieve high level of stakeholders engagement and efficient management of social conflicts • Incentives and control measures for private sector participation institutionalized

Rural Sanitation strategy Institutional Development Model

Means | Ways | Ends



Core Strategy 2: **Enabling the Multi-Sectors and Multi-Stakeholders Approach**

Means	Ways	Ends
Political will This strategy has to be translated explicitly in: Sector Policies Water Laws The revised mandate of water Organizations	Rural sanitation problems and solutions are multi-sectors and multi-stakeholders in nature. This strategy is aiming to achieve high level of effective integration of the input needed from different sectors (ministries) to solve rural sanitation problem on the local level. This strategy addresses the need to define the roles and responsibilities of all involved sectors and to develop the regulatory system to monitor agreed-upon inputs and to hold each party accountable. Enabling the multi-sectors and multi-stakeholders approach assumes that there will be a lead institution who will be assigned the responsibility of integration and coordination.	Lead institution is mandated and held accountable for the integration and coordination of all sectors and stakeholders inputs during the implementation of rural sanitation programs. Roles and responsibilities of line ministries, local government, and stakeholders are defined, internalized into their own management processes.

Multi-Sectors and Multi-Stakeholders as Presented in the Strategy Analysis

Means	Ways	Ends

Different sectors which need to be mandated to undertake their responsibilities are:

Ministry of Housing, Utilities and New Communities:
Ministry of Finance
Ministry of International Cooperation
Ministry of Local Development
Ministry of Health
Ministry of Environment
Ministry of Irrigation and Water Resources
Research Institutions
Local Industry
Private sector
Local communities

Core Strategy 3: Progressive Multi-level Service Provision

Means	Ways	Ends
Resources to implement programs 1,2,3 and P4: Financial resources Consultants Contractors Materials and Equipment	This strategy realizes that Egypt is high on the WHO/UNICEF sanitation ladder (the containment), but low when it comes to coverage with integrated wastewater management with efficient treatment and disposal function. This strategy introduces the concept of Sanitation Service Levels (SSLs) and applies it in the design of national rural sanitation programs. The multi-level service provision strategy is based on in-depth analysis of rural sanitation in Egypt. It recognizes the past, present and future course of actions.	Rural sanitation programs designed and approved: **P1:** Scaling-up of sound sanitation infrastructure. **P2:** Upgrading and Expanding Rural Sanitation Infrastructure to Provide Affordable and Acceptable Level of Service. Centralization of the Service Delivery Model **P3:** Applying Cluster Optimization in National Level-Identified and Prioritized Areas. **P4:** Territorial and Functional Integration: Applying Multi-Cluster Optimization in National Level-Identified Watersheds of Main Drains

Core Strategy 3: Progressive Multi-level Service Provision

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Resources to implement programs 1,2,3 and P4: Financial resources Consultants Contractors Materials and Equipment	This strategy realizes that Egypt is high on the WHO/UNICEF sanitation ladder (the containment), but low when it comes to coverage with integrated wastewater management with efficient treatment and disposal function. This strategy introduces the concept of Sanitation Service Levels (SSLs) and applies it in the design of national rural sanitation programs. The multi-level service provision strategy is based on in-depth analysis of rural sanitation in Egypt. It recognizes the past, present and future course of actions.	Rural sanitation programs designed and approved: **P1:** Scaling-up of sound sanitation infrastructure. **P2:** Upgrading and Expanding Rural Sanitation Infrastructure to Provide Affordable and Acceptable Level of Service. Centralization of the Service Delivery Model **P3:** Applying Cluster Optimization in National Level-Identified and Prioritized Areas. **P4:** Territorial and Functional Integration: Applying Multi-Cluster Optimization in National Level-Identified Watersheds of Main Drains

Rural Sanitation Service Levels (SSLs)

Service Level	Service level requirements	Illustration
SSL1	• Provision of sewerage on village level. • Provision of pumping stations, force mains and treatment plants.	
SSL2	FOR EVERY VILLAGE PREVIOUSLY COVERED BY SSL1: • Provision of an organized, accessible and affordable Bayara evacuation system for the non-sewered areas. • Upgrading the pumping stations and treatment plants to cope with fecal sludge additional flow. • Provision of hygiene education to served communities. • Phasing out of all direct disposal connections from the Bayara(s) to groundwater (if any).	

Rural Sanitation Service Levels (SSLs)

Service Level	Service level requirements		Illustration
SSL3	FOR EVERY CLUSTERS TYPE (A) SELECTED, SATISFY SSL2 IN ALL VILLAGES IN THE CLUSTER, PLUS: • Integrated Treatment Facility (ITF) for every selected cluster. • Provision of co-treatment of sludge and the organic fraction separated from MSW collected from villages in the geographical domain of the cluster.	Villages covered by SSL2 to be integrated in each cluster	
SSL4	FOR ALL CLUSTERS (TYPE B) IN THE GOEGRAPHICAL DOMAIN OF THE WATERSHED OF THE MAIN DRAIN, SATISFY SSL3 FOE ALL VILLAGES IN ALL CLUSTERS, PLUS: • Enforcing environmental laws on existing industries in all clusters in the watershed of the main drain.	Villages covered by SSL2 to be integrated in each cluster	

Progressive Multi-level Service Provision

Means | Ways | Ends

Component	SSL1	SSL2	SSL3	SSL4
Sewrage and WWTP	x	x	x	x
Faecal sludge management		x	x	x
Demolishing Kayson connections		x	x	x
MSW management			x	x
Hygiene education		x	x	x
Protection from Industrial waste				x
Cluster level integration			x	x
Watershed total solution				x

تعريف مستويات التغطية الأربعة

المسمي	التعريف
مستوي التغطية الأول	هو مستوي "ترفيق الكتل السكنية" ويتيح إمكانية توصيل المنازل بالقري علي شبكات الصرف الصحي وما يستتبعها من محطات رفع لنقل مياه الصرف الصحي المجمعة الي محطات مصممة خصيصا لمعالجة مياه الصرف الصحي ، وهو مستوي التغطية الذي تحقق من تنفيذ مشروعات الصرف الصحي التي دخلت الخدمة في حقب سابقة. يمكن أن يتحقق مستوي التغطية الأول بتنفيذ مشروعات منفردة علي مستوي القري.
مستوي التغطية الثاني	يتيح هذا المستوي من التغطية خدمة منظمة وفعالة لكسح البيارات من المناطق غير المخدومة بشبكات في القري التي تمت خدمتها بمستوي التغطية الأول مع تطوير محطات الرفع ومحطات المعالجة لاستيعاب التدفقات الزائدة من ناتج كسح البيارات. توسيع نطاق الخدمة الي العزب والنجوع المجاورة ، ويتم يتطلب هذا المستوي من التغطية تنفيذ برامج لرفع مستوي المشاركة المجتمعية والتوعية الصحية للمواطنين. يتلازم مع تحقيق هذا المستوي من التغطية إلزام المواطنين بإلغاء نظام التصريف المباشر للبيارات علي المياه الجوفية (القياسين).
مستوي التغطية الثالث	هو المستوي المطور لمستوي التغطية الثاني، ويهدف الي تلبية الي تحقيق رفع في مستوي الصحة العامة وصحة البيئة بالقري والمجاري المائية المتاخمة من خلال: • تطوير المنظومة الفنية والإدارية لحل مشكلة ناتج كسح البيارات في المناطق غير المخدومة بشبكات باعتبار **منطقة الخدمة** هي الوحدة التخطيطية والادارية • بناء منظومة فنية وإدرية لحل مشكلة المخلفات الصلبة المنزلية • ترسيخ برامج رفع مستوي المشاركة المجتمعية والتوعية الصحية للمواطنين يتطلب هذا المستوي من التغطية تطوير محطات المعالجة القائمة الي **محطات معالجة متكاملة** لاستيعاب تدفقات ناتج كسح البيارات والمكون العضوي بالمخلفات الصلبة. يتطلب تحقيق مستوي التغطية الثالث أن يتم تنفيذ المشروعات علي مستوي منطقة الخدمة وفق إستراتيجية الصرف الصحي بالقري ٢٠٠٨ ، دون التقيد بموقع منطقة الخدمة من الأحواض المائية للمصارف الرئيسية.
مستوي التغطية الرابع	هو المستوي المطور لمستوي التغطية الثالث ، ويهدف الي تحقيق أهداف "ترفيق الكتل السكنية" ورفع مستوي الصحة العامة وصحة البيئة بالقري ،مع تحقيق تحسين جوهري في مستوي جودة المياه في المصارف الزراعية الرئيسية وصولا الي المستوي الذي يتيح إعادة إستخدامها كمورد مائي محسوب ضمن الميزان المائي بمصر. يتحقق هذا المستوي من التغطية من خلال: • تنفيذ مشروعات الصرف الصحي علي **مستوي جميع مناطق الخدمة الواقعة في الحوض المائي للمصرف الرئيسي** لترفيق الكتل السكنية ومعالجة مياه الصرف الصحي الي مستوي المعالجة الثنائية • تطوير منظومة فنية وادارية لحل مشكلة ناتج كسح البيارات في المناطق غير المخدومة بشبكات • تطوير منظومة فنية وإدرية لحل مشكلة المخلفات الصلبة المنزلية • العمل والتنسيق مع الجهات المختصة لتحقيق التزام المنشآت الصناعية بالقوانين البيئية • تحقيق مستوي فعال من المشاركة المجتمعية والارتقاء بمستوي الوعي الصحي للمواطنين يتطلب تحقيق مستوي التغطية الرابع تنفيذ المشروعات علي مستوي **جميع مناطق الخدمة** في **الحوض المائي للمصرف الرئيسي**.

Core Strategy 4: **Territorial and Functional Integration and Participatory Planning**

Means	Ways	Ends
Integration concepts are specified in the technology packages and guidance manuals	This strategy calls and enforces several levels of integration and applies participatory planning methods: 1. Geographical Integration (clustering approach): Towns and villages Villages within a cluster Clusters within a watershed 2. Functional Integration: Wastewater and faecal sludge Sludge, faecal sludge and the OFMSW 3. Project Integration: Integration of old assets with new assets Integration between Hard and Soft project components	All programs and projects are planned and designed following the integration rules and procedures.

Core Strategy 5: **Development of Technological Packages and Systems**

Means	Ways	Ends
Consultants Research Institutions Local Industry	Wastewater management packages Faecal sludge management packages Solid waste management packages Industrial waste abatement packages Water quality modelling and monitoring Each Package covers: planning, design, CM/CS, O&M	Standardized Systems More efficient and effective systems

Technological packages

Technological package for planning, construction, operation and maintenance:

- Planning guidelines
- Design, tender preparation and modular designs
- Tendering, contracting and C/S guidelines
- O&M tender documents and model contracts

1. Technological package for planning, construction, operation and maintenance
2. Finance and cost recovery package
3. PSP projects package
4. Land acquisition package
5. Capacity building and HR development package
6. Monitoring and Evaluation package
7. Stakeholders engagement and hygiene education package
8. Local industry and research institution engagement package
9. Coordination with responsible agencies package
10. Dispute resolution package
11. Knowledge management package

Knowledge Management Package:
Monitoring and analysis of:

- Changes in environmental health and public health in villages
- Social changes
- Demographic and urban changes
- Economic returns
- Climate change impacts
- Progress in relation with industry
- Progress in relation with research institutions
- Emerging new technology

بيان الحزم التكنولوجية والمنظومات

رقم	إسم الحزم والمنظومات
١	مجموعة الحزم التكنولوجية للتخطيط والتنفيذ والتشغيل والصيانة
٢	منظومة التمويل واستعادة التكاليف
٣	منظومة مشروعات مشاركة القطاع الخاص
٤	منظومة إدارة عمليات تدبير وشراء الأراضي
٥	منظومة بناء القدرات وتنمية وإدارة الموارد البشرية
٦	منظومة المتابعة والرقابة والرصد المبكر لمؤشرات الاخفاق
٧	منظومة تعضيد المشاركة المجتمعية والارتقاء بمستوي الوعي الصحي
٨	منظومة الترابط مع الصناعة والمراكز البحثية
٩	منظومة التنسيق مع الجهات والمؤسسات ذات الصلة
١٠	منظومة إدارة المعرفة
١١	منظومة فض المنازعات

مجموعة الحزم التكنولوجية

المرحلة	الهدف	المجال
التخطيط	إعداد الأدلة التخطيط	• تحديد أولويات الأحواض المائية للمصارف الرئيسية وفقا لمعايير الأولوية • تحديد مناطق الخدمة الواقعة في النطاق الجغرافي للأحواض المائية للمصارف الرئيسية • تحديد أولويات مناطق الخدمة علي المستوي القومي وفقا لمعايير الأولوية • إعداد المخططات التفصيلية علي مستوي منطقة الخدمة
التصميم	إعداد أدلة التصميم والشروط المرجعية وإعداد النماذج النمطية	• تصميم شبكات الصرف الصحي علي مستوي منطقة الخدمة • تصميم نظم جمع ونقل ناتج كسح البيارات علي مستوي منطقة الخدمة • تصميم أعمال تطوير محطات الرفع ومحطات المعالجة القائمة لاستيعاب تدفقات ناتج كسح البيارات • تصميم محطات معالجة مياه الصرف الصحي • تصميم نظم معالجة الحمأة والمكون العضوي بالمخلفات الصلبة وإنتاج الطاقة • تصميم نظم إعادة إستخدام مياه الصرف الصحي المعالجة
التنفيذ	إعداد الأدلة والشروط المرجعية	• إدارة المشروعات • الاشراف علي التنفيذ
التشغيل	إعداد الأدلة والشروط المرجعية ونماذج العقود	• أعمال التشغيل والصيانة لشبكات الصرف الصحي • أعمال التشغيل والصيانة لمحطات الصرف الصحي • ترشيد إستخدامات الطاقة • أدارة الأصول

منظومة إدارة المعرفة

رقم	الهدف	المجال
منظومة ١٠	تجميع البيانات وتحليلها وإنتاج التقارير الدورية المعنية بالتغيرات التي ستحدث بالتوازي مع التقدم في تنفيذ البرامج والعمل علي إتاحة المعرفة ومناقشة المضمون مع الخبراء ذوي الصلة بالبرنامج القومي للصرف الصحي بالقري	رصد وتحليل تغير الوضع البيئي والصحي علي مستوي القري ومناطق الخدمة والأحواض المائية رصد وتحليل التغيرات المجتمعية رصد وتحليل التغيرات الديموجرافية والعمرانية بالقري المصرية رصد وتحليل العوائد الاقتصادية الإيجابية لتنفيذ المشروعات رصد وتحليل تأثير التغيرات المناخية رصد وتحليل تطور العلاقة مع الصناعة المحلية رصد وتحليل تطور العلاقة مع مراكز البحث العلمي والجامعات رصد وتحليل التقدم التكنولوجي علي المستوي العالمي

Core strategy 6: **Green Economy Focus Strategy**

Means	Ways	Ends
Green economy concepts are specified in the technological packages and guidance manuals	This strategy calls and enforces the green economy principles in the design and implementation of rural sanitation programs and projects. The main focus is the following elements of green economy: 1. The application of water conservation practices on the village level 2. The application of resource efficiency principles in the design of all technological packages (Water, materials and energy) 3. Enabling innovation in developing rural sanitation solutions 4. Emphasizing the importance of employment generation 5. Enabling the application of new financial mechanisms	Rural sanitation projects and programs are planned, designed and implemented with green economy principles applied.

Core strategy 7: **Maximizing the Potentials of Economies of Scale**

Means	Ways	Ends
Economy of scale concepts are specified in the technological packages and guidance manuals	This strategy calls and enforces set or rules and procedures to maximize the benefits and gains which should be exploited due to the mega size of national rural sanitation programs. The strategy focuses on: 1. Standardization of systems and components 2. Long-term planning of human resources development 3. Local production 4. Volume negotiations	Rural sanitation programs have been designed and implemented applying set of rules and procedures to operationalize this strategy.

4 Design of Rural Sanitation Programs

P1	Scaling-up of Sound Sanitation Infrastructure
P2	Decentralization: Upgrading and Expanding Rural Sanitation Infrastructure to Provide Affordable and Acceptable Level of Service with Full involvement of Local Public Service providers
P3	Centralization of the Service Delivery Model: Applying Cluster Optimization in National Level-Identified and Prioritized Areas
P4	Territorial and Functional Integration: Applying Multi-Cluster Optimization in National Level-Identified Watersheds of Main Drains

درجة التعقد في تصميم البرنامج القومي للصرف الصحي بالقري:

التعقد الفني:

١. كل منطقة خدمة لها ظروفها المختلفة من حيث الموقع الجغرافي وعدد القري والعزب وتوزيعها بالنسبة لبعضها وبالنسبة للطرق الموصلة والمجاري المائية، وتختلف ظروفها من حيث إتجاهات التوسع في الكتل السكنية أوالتحامها.

٢. التخطيط العام علي مستوي منطقة الخدمة يستلزم تجميع كم كبير من البيانات الحقلية علي مستوي جميع القري حتي يمكن الوصول الي الحل الأمثل الذي يحقق أقل عدد من محطات الرفع والعدايات.

٣. تخطيط وتصميم وتنفيذ شبكات الصرف الصحي علي مستوي القرية الواحدة

يتطلب دراسة ميدانية لظروف المساحة ومنسوب المياه تحت السطحية في كل قرية.

٤. تصميم الحلول الملائمة لخدمة العزب والنجوع ذات التعداد أقل من ١٠٠٠ نسمة والمنطق الضيقة من القري التي لن يتسن توصيلها علي شبكات لنظم إدارة ناتج كسح البيارات ، يتطلب البحث عن حلول بديلة تتلاءم مع الظروف الاجتماعية والثقافية ، ويتطلب مستوي عال من التواصل مع المجتمع المحلي.

٥. تحقيق التكامل بين معالجة ناتج كسح البيارات والصرف الصحي والمكون العضوي بالمخلفات الصلبة البلدية سوف يستلزم جهدا مكثفا في تصميم النظم وتحقيق التكامل المؤسسي بين الوحدات المحلية وفروع الشركات التابعة لمياه الشرب والصرف الصحي.

٦. تعظيم العائد من الاستثمارات التي أنفقت في حقب سابقة يستلزم تحقيق التكامل بين مكونات هذه المشروعات وبين المشروعات الجديدة لتحقيق نسبة أعلي من التغطية بالشبكات ومحطات المعالجة، من أمثلة الحالات الصعبة حالة الصرف السلبي في محافظة الدقهلية.

مستوي اللايقين في البرنامج القومي للصرف الصحي بالقري:

١. توقعات الزيادة السكانية في القري الواقعة في وادي النيل عموما والدلتا خصوصا تخضع لدرجة عالية من اللايقين، وتطرح السؤال المختص بالحدود القصوي لتحمل إيكولوجية الوادي maximum carrying capacityلأي زيادة سكانية مستقبلا.

٢. مستقبل الأحوزة العمرانية للقري والتوابع هو أيضا خاضع لدرجة عالية من اللايقين ، والتي هي الأساس بالضرورة لإعداد تصور عن توسعات شبكات الصرف الصحي في المستقبل.

٣. مستقبل التطور العمراني بالقري محفوف بدرجة عالية من اللايقين . من ناحية لايوجد تصور عن أمكانة تطبيق أليات التشذيب العمراني وتطبيق كود للمباني والطرق الداخلية ، ومن ناحية أخري، من غير المتصور أن تستمر عشوائية التخطيط العمراني بالقري المصري دون حدوث تطور جذري.

٤. معدل إستهلاك مياه الشرب في المستقبل سوف يتوقف علي عدة عوامل متداخلة ترتبط بتوفر شبكات الصرف الصحي (والتي تؤدي الي زيادة معدل الاستهلاك) ، وتنفيذ برامج لترشيد الاستهلاك (بما في ذلك تطبيق الزدوات الاقتصادية) والتي يمكن أن تؤدي الي خفض الاستهلاك.

٥. توفر الأراضي المطلوبة لإنشاء محطات المعالجة من حيث المساحة والموقع والسعر ، خاضع أيضا لدرجة عالية من اللايقين.

٦. إمكانية تطبيق الأجيال القادمة لتكنولوجيات المعالجة وإدارتها تخضع أيضا لدرجة عالية من اللايقين.