エジプト・アラブ共和国

農村集落排水改善計画

プロジェクトファインディング調査報告書

平成２１年７月

社団法人　海外農業開発コンサルタンツ協会

まえがき

社団法人　海外農業開発コンサルタンツ協会（ADCA)は、農林水産省の補助事業として平成 21 年 7 月 17 日から 7 月 27 日までエジプト・アラブ共和国に調査団を派遣し、プロジェクトファインディング調査を実施した。

本調査では、エジプト・アラブ共和国において「農村集落排水改善計画」について相手国政府関係者との打合せや資料、情報収集および現地踏査を行い、その調査結果を本報告書にとりまとめた。

本調査の実施に際しご協力頂きましたエジプト・アラブ共和国政府機関、日本大使館、JICA 事務所、JICA 専門家など多くの関係者各位に深く感謝の意を表する次第である。

平成 21 年 7 月

プロジェクトファインディング調査団団長
安村　廣宣

案件概要

国　名	(和)エジプト・アラブ共和国 (外)Arab Republic of Egypt	案件名	(和)農村集落排水改善計画 (外)Rural Sewage Improvement
地区名	(和)バハルエルヌール	(外)Bahr El Nour	
相手国機関	(和)水資源灌漑省	(外)Ministry of Water Resources and Irrigation	

1. 事業の背景

エジプトは降雨が極端に少なく、水資源を唯一の河川であるナイル川に依存している状況にあり、その量は 1959 年のスーダンとの水利協定により年間 555 億 m^3 とされている。

2005 年に策定された国家水資源計画では、近年の年率 2%という急激な人口増加、農業・経済の発展等に伴い、2017 年には水需要が 2000 年の 20%の増加になるとして、排水の再利用、地下水開発、既耕地での灌漑効率の向上、海への無効放流削減等を行うこととしている。排水の再利用については、排水路の水質が悪化してきているため、汚濁の発生源対策、水路内での直接浄化等により排水路における水質改善が図られなければ、排水再利用を計画通りに実現することは困難な状況にある。

2. 事業の概要

エジプト政府は、今後、相当量の排水再利用を見込んでいる。灌漑用水に使用されている水質は、著しく悪化していることから、管理組織体制つくりのためのソフトコンポーネントを含め、排水再利用を目的とした水質の改善対策を検討する。事業内容としては、汚水処理システム、農業廃棄物等汚染物質処理システム、中間排水再利用システムに大別される。

3. 調査の概要

WMIPⅡバハエルヌール地区の周辺地域では、場所により測定限界を超えた数値を示す個所もあり、汚濁が進んだ排水路も確認された。例えば、バハエルヌール地区内のいずれの排水路においても、COD は日本の農業用水水質基準値(水稲)の２倍以上の数値を示した。また、窒素及びリンの栄養塩類に関しては、何れの水路に於いても富栄養化現象を誘発すると想定される濃度(窒素 2mg/L、リン 0.2mg/L)以上が計測され、実際の用排水路でも富栄養化現象の象徴であるホテイアオイ等の水生植物や藻類の繁茂が散見された。なお、透視度に関しては、滞留している排水において一部白濁(土質の関係か)しているものの、概ね 30 cm以上と推定された。

4. 今後の展望

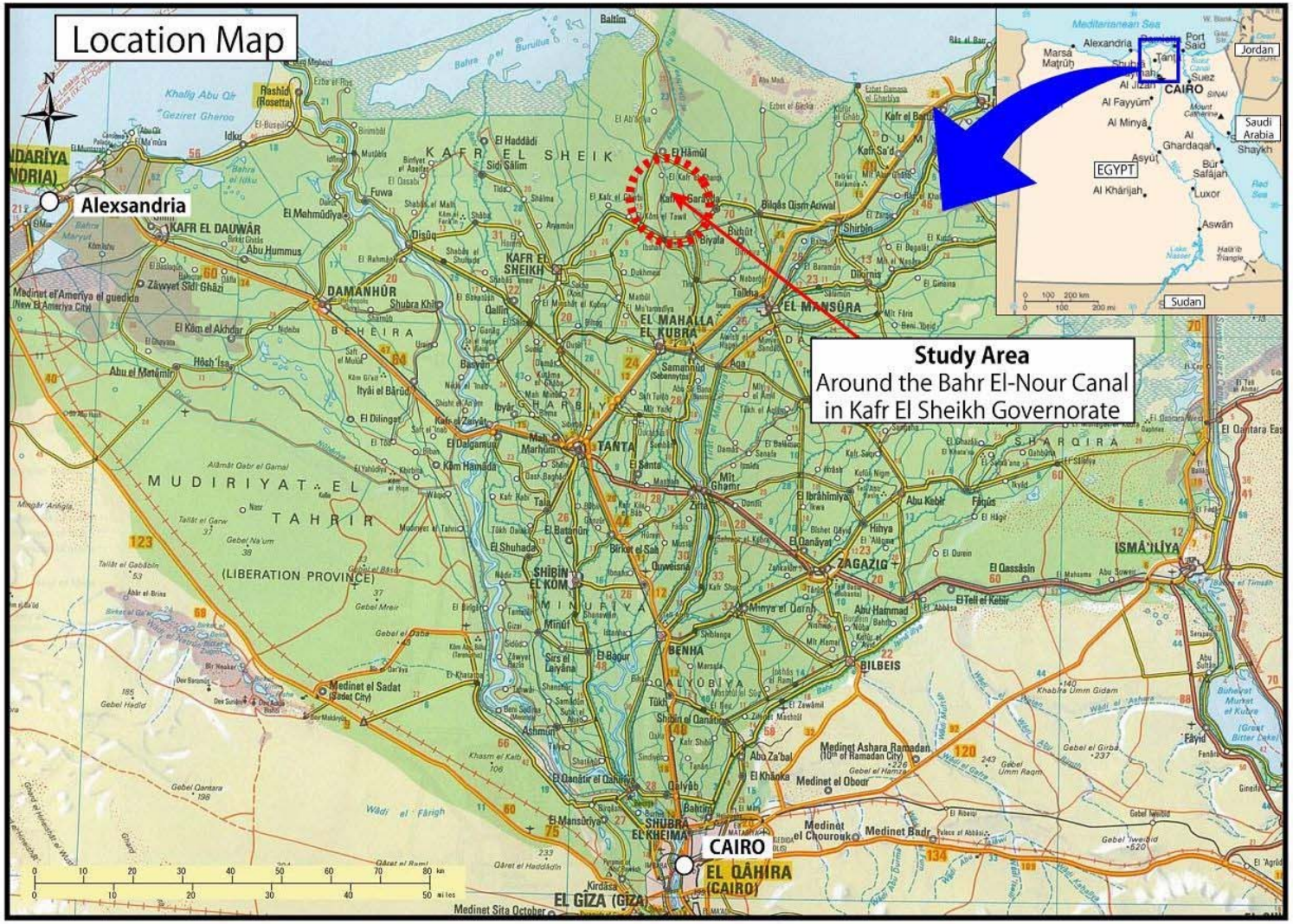
①汚水処理システム；直接浄化施設、集落排水施設等の設置については、現地状況からその必要性は十分認められた。太陽光発電導入の可能性も検討の余地がある。

②農業廃棄物等汚染物質処理システム；小規模分散型の堆肥化施設の設置が妥当と考えられ、バイオエネルギー施設設置は、十分な検討が必要である。

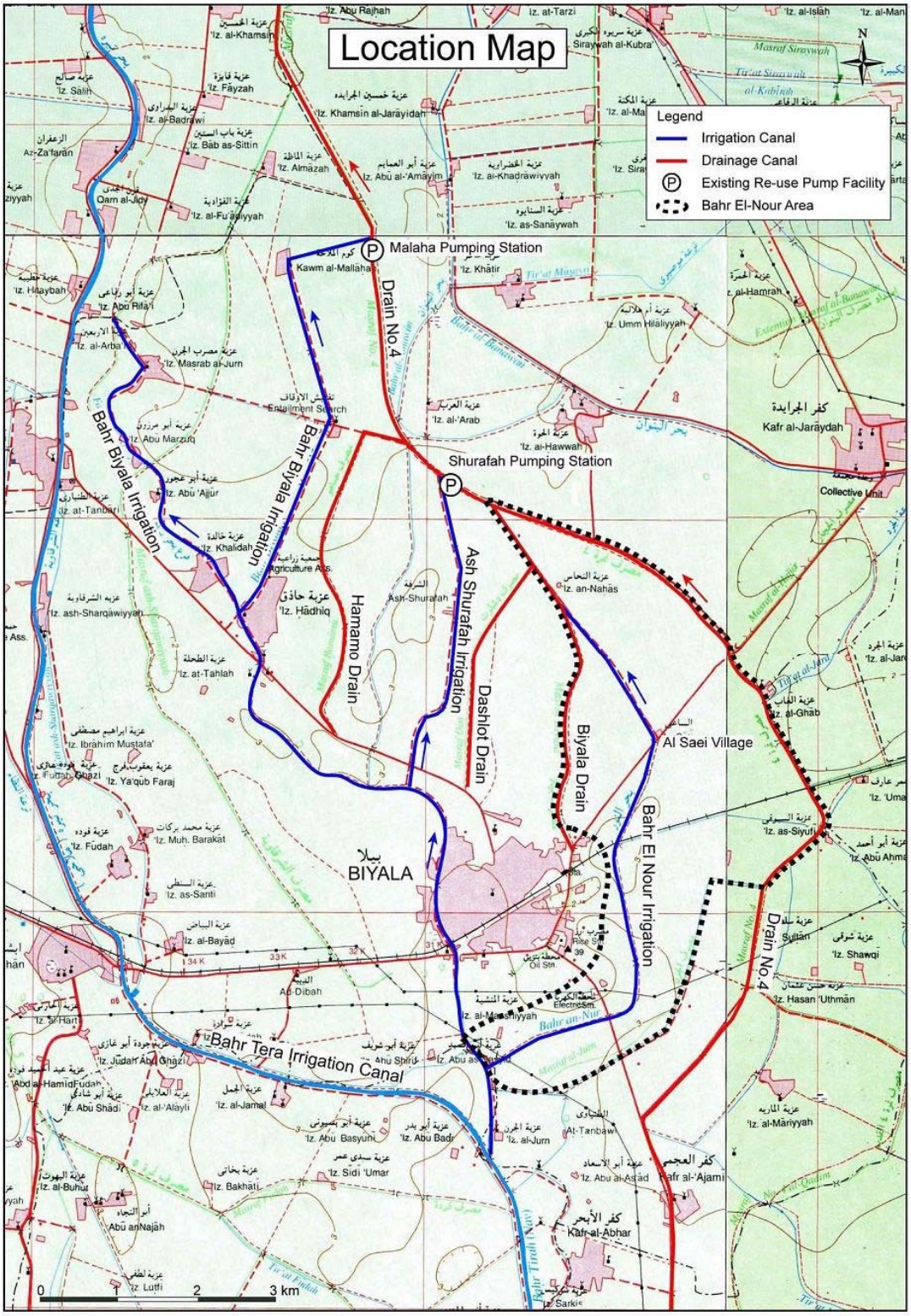
③中間排水再利用システム；中間排水を再利用するためのポンプ付帯型ゲートの採用を検討する。

目　　次

1. 位置図


Location Map
Alexsandria
Study Area
Around the Bahr El-Nour Canal
in Kafr El Sheikh Governorate
CAIRO
EL QÂHIRA
(CAIRO)
EL GIZA (GIZA)
TANTA
ZAGAZIG
BILBEIS
DAMANHÛR
EL MAHALLA
EL KUBRA
EL MANSÛRA
SHIBÎN
EL KÔM
BENHA
KAFR EL
SHEIKH
KAFR EL DAUWÂR
MUDIRIYAT EL
TAHRIR
(LIBERATION PROVINCE)
BEHEIRA
GHARBIYA
SHARQIRA
MINUFIYA
QALYÛBIYA
ISMÂ'ILIYA
Jordan
Saudi
Arabia
EGYPT
Sudan
Alexandria
CAIRO
Suez
Aswân
Luxor
Shaykh

2. 計画一般図


Location Map
Legend
Irrigation Canal
Drainage Canal
Existing Re-use Pump Facility
Bahr El-Nour Area
Malaha Pumping Station
Shurafah Pumping Station
Drain No.4
Bahr Biyala Irrigation
Bahr Biyala Irrigation
Hamamo Drain
Ash Shurafah Irrigation
Dashlot Drain
Biyala Drain
Bahr El Nour Irrigation
Drain No.4
Bahr Tera Irrigation Canal
BIYALA
Al Saei Village
Kafr al-Jaraydah
Collective Unit
Kafr al-Abhar
Kafr al-Ajami
0 1 2 3 km

3. 地区の概要

3-1. 調査の背景と目的

(1)調査の背景

エジプトは降雨が極端に少なく、水資源を唯一の河川であるナイル川に依存している状況にあり、その量は1959年のスーダンとの水利協定により年間555億m^3とされている。

2005年に策定された国家水資源計画では、近年の年率2%という急激な人口増加、農業・経済の発展等に伴い、2017年には水需要が2000年の20%の増加になるとして、排水の再利用、地下水開発、既耕地での灌漑効率の向上、海への無効放流削減等を行うこととしている。

排水の再利用については、2000年の年間49億m^3から2017年には年間84億m^3に増加させる計画であるが、特に農村地域では下水道整備の遅れ、家畜糞尿等の水路への流入等により、排水路の水質が悪化してきているため、汚濁の発生源対策、水路内での直接浄化等により排水路における水質改善が図られなければ、排水再利用を計画通りに実現することは困難な状況にある。

(2)調査の目的

調査では、農村地域における排水路の水質を改善して灌漑用水へ補充することにより、水利用の効率化を図ることを目的として、水資源灌漑省等関係機関からの資料や情報の収集、現況把握のための現地調査等を通し、緊急に協力可能な事業の検討を行うとともに、今後の協力の方向性を検討するものである。

3-2. 地区概要

調査対象地区はカフルエルシェイク県バハルエルヌール地区及びその周辺である。

カフルエルシェイク県は、ナイルデルタ地域北部沿岸部に位置し、人口273.9万人（2009年）である。同県の産業は農業を主体とし、主作物の米は「エ」国の3割を生産し、綿工業、漁業、食品加工業も盛んである。

バハルエルヌール地区はカフルエルシェイク県の行政中心地カフルエルシェイク市より東北東約30kmに位置するビヤラ町（人口約244千人）に隣接する農業地帯である。

バハルエルヌール地区は排水路No.4とビヤラ排水路に囲まれた灌漑面積4,200 feddan（約1,720ha）の農業地帯であり、米、小麦、牧草（ベルシーム）、サトウ大根、綿花等が作られている。

バハルエルヌール地区の主灌漑施設は、地区中央を流れるバハルエルヌール灌漑水路で

ある。2000 年から 2007 年にかけて実施された日本の技術協力プロジェクト「水管理改善プロジェクト：WMIP)」により、バハルエルヌール灌漑水路から取水する末端水路（メスカ）毎に水利組合が設立され、パイプライン化されたメスカの取水口に、バハルエルヌール灌漑水路から灌漑用水が揚水され、各圃場に配水するシステムが形成されている。現在、水管理改善プロジェクトフェーズ 2（WMIP-2）が実施中であり、バハルエルヌール灌漑水路レベルでの水利組合（Branch Canal Water Users Association）の能力向上支援が進められている。

バハルエルヌール地区灌漑水路の水質は、本現地調査結果では問題があり、この水路沿いにある集落から直接汚水及び生活雑排水が流入しているため、灌漑水路は汚染されていると考えられる。

一方、バハルエルヌール地区のビヤラ排水路は、最上流に位置するビヤラ市の生活排水を取り込んで流下し、中流地点でバハルエルヌール灌漑水路からの余剰水が流入し、下流部でダシュロット排水路と合流し、排水路 No.4 に合流している。

また、バハルエルヌール地区の西部地域には、排水路 No.4 の水を再利用して灌漑水路に送る既存の再利用ポンプが 2 ヶ所あり、それぞれアシュシュラファ灌漑水路に揚水するシュラファポンプ場、バハルビヤラ灌漑水路に揚水するマラハポンプ場が存在する。

これらバハルエルヌール地区及びその周辺の水質は、地区上流部からの汚染された排水が流れ込み、排水路の水をそのまま灌漑用水に再利用するには「エ」国の排水再利用水質基準に適合していない状況である。一方、地区内を流下する灌漑水路沿いにある集落から生活雑排水がそのまま灌漑水路に流入している。さらに、各集落周辺のみならず水路沿いのいたるところに家畜の糞尿及び稲藁が集積され堆肥として利用されているが、その一部が用水路内に落ち、水質を汚染している状況である。

3-3. 調査の概要

当初は、JICA の水管理改善プロジェクトフェーズⅡ(WMIPⅡ)の対象地域内で、集落排水施設等の案件を発掘する予定であったが、水資源灌漑省から環境プログラム無償として「灌漑用水水質改善コンプレックス構築」が日本政府に要請されたため、今回の調査では、主にカフルエルシェイク県において現地を踏査して要請内容を確認し、要請の各コンポーネントについての実現可能性及び今後の方向性を検討した。

水質浄化施設や排水再利用施設の設置に当たっては、その前提条件及び妥当性（水利用状況、現況水質等)を確認することが必要であることから、現地聞き取りや簡易な水質試験による水質概要把握を試みた。簡易な水質試験については、比色法を原理としたパックテストを活用し、COD（化学的酸素要求量)、NH_4^+-N（アンモニア態窒素)、PO_4^{3-}-P(リン酸態リン)及び残留塩素を計測した。さらに、透視度の目視観察も行った。

WMIPⅡバハエルヌール地区の周辺地域では、場所により測定限界を超えた数値を示す個所もあり、汚濁が進んだ排水路も確認された。例えば、バハエルヌール地区内のいずれの排水路においても、CODは日本の農業用水水質基準値(水稲)の２倍以上の数値を示した。また、窒素及びリンの栄養塩類に関しては、何れの水路に於いても富栄養化現象を誘発すると想定される濃度(窒素 2mg/L、リン 0.2mg/L)以上が計測され、実際の用排水路でも富栄養化現象の象徴であるホテイアオイ等の水生植物や藻類の繁茂が散見された。なお、透視度に関しては、滞留している排水において一部白濁(土質の関係か)しているものの、概ね 30 cm以上と推定された。

以上のことから、中間排水を灌漑用水として再利用するためには、汚濁の発生源対策を実施するとともに、排水路の水質浄化が必須であると判断された。

ADCA 調査によるバハルエルヌール地区の主な簡易水質試験結果（2009 年 7 月）

水質項目 ＼ 測定地点	①	②	③	④	⑤
化学的酸素要求量 COD (mg/l)	15～18	18～20	30	15～16	15～18
アンモニア性窒素 NH4 (mg/l)	0.5～1.0	2.0	2.0～5.0	1.0～2.0	1.0～2.0

注）1. 調査方法は、比色法による簡易水質試験である。
2. 調査地点は、①; 集落下流部排水路　②; №４排水路　③; カナビア排水路　④; バハルヌール用水路　⑤; バハルヌール用水路横の排水路

3-4. 環境プログラム無償に係る調査結果

3-4-1. 施設の設置予定地

水資源灌漑省の県事務所担当部長及びバハエルヌール地区水利組合長とともに、汚水処理システム及び農業廃棄物等汚染物質処理システムの設置候補地を踏査した。候補地は、バハルエルヌール地区の下流部で、支線排水路に用水路の端末が合流する地点から数百 m 下流に位置する集落の直下流が適地と考えられた。

なお、支線排水路は更に約１km 下流でこの地域の基幹排水路である No. ４幹線排水路に合流している。

3-4-2. 各コンポーネントに対する調査結果

(1)汚水処理システム

直接浄化施設、集落排水施設等の設置については、現地状況からその必要性は十分認められた。直接浄化施設(In-stream treatment)については、水質汚濁レベル、施設用地の観点から、マイクロバブル・水生植物利用・湿地法による浄化を組み合わせた施設の設置が妥当と認められた。

図-1 ﾏｲｸﾛﾊﾞﾌﾞﾙｲﾝｼﾞｪｸﾀｰ

なお、バブル発生器等の動力設備については、電力供給による電源、ディーゼル発電機または太陽光発電の導入を候補とし、現地の状況を精査の上、決定する事が妥当と判断された。
設置場所については、汚濁の進んでいる排水路の数m幅の水路敷内を候補とし、必要な施設規模(容量等)は、施設長さにより調整するものとする。

集落排水施設については、集落及び各家が分散している現地状況を勘案し、対象戸数を限定し、簡易処理施設による排水路流入の前処理施設として検討する。設置場所は、上記と同様に数m幅の水路敷内を候補とする。

高度な膜処理については、現況水質、水利用の実態、コスト、維持管理性、将来の普及可能性等の観点から、候補地での適用は難しいと判断された。

(2)農業廃棄物等汚染物質処理システム

家畜糞尿等の農業廃棄物が用排水路脇に野積みされており、それらが用排水路に落下して汚染源になっている可能性が高いという実態が確認された。

堆肥化施設については、個別農家単位で小規模な堆肥製造に取り組んでいるため、本事業により簡易で効果的な堆肥化施設を設置し、運営管理指導を併せ行った場合には、高い実現性と事業効果が期待できる。ただし、分散されている農業廃棄物の収集･運搬及び施肥の容易性を考慮して、施設規模と設置個所を検討することが必要と考えられた。

なお、汚水処理システムを設置予定する集落には、施設用地(地区全域からの農業廃棄物を処理するような大規模な施設設置は無理)があるので、モデルケースとしてこの場所に堆肥化施設の設置を予定するものとし、他の設置場所については、今後の検討課題と考えられる。

バイオエネルギー施設は、当地のガス・石油が安価なこと、農業廃棄物が分散されていることから等から、投入する以上のコスト及びエネルギーを生産・回収することが困難な

状況であり、再検討が必要であると考えられた。

(3)中間排水再利用システム

ポンプ付帯型ゲートは、中間排水を灌漑用水に再利用するために必要な最新の設備であり、2004 年の ADCA 調査を踏まえて、水資源灌漑省排水庁としてその供与を 2005 年頃より要請・検討していることから、実現可能性が極めて高い状況であり、仕様についても概定済みである。

エジプト側関係者とともに現地調査を行いバハルエルヌール地区下流部で設置予定地の大まかな特定を行った。

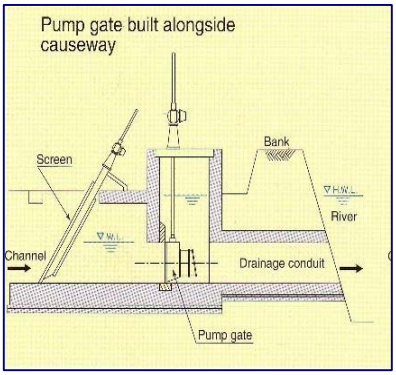


図-2 ポンプ付帯型ゲート

(4)ソフトコンポーネント

エジプト(バハルエルヌール地区)にとっては、何れの施設についても最新・高度な日本の水環境技術である上に、供与予定の機材・施設の有効活用について、水利組合等の積極的な関与が必須かつ重要と考えられるため、技術支援は不可欠であると判断された。

(5)草の根無償・人間の安全保障資金協力事業に係る調査結果

小規模な直接浄化施設（マイクロバブル・水生植物の組合せ）又は簡易集落排水処理施設の導入を、WMIPⅡの協力対象地域であるファヨーム県において実施することが考えられる。

4. 添付資料

(1)調査従事者

氏　　名	担　　当	所　　属
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≪同行者≫

杉田　秀雄 Sugita　Hideo	汚水･排水処理技術	社団法人　資源循環技術センター 地域資源循環研究所　主席研究員

⑵調査日程

7 月 17 日(金)～7 月 27 日(月)　11 日間

日	内　　容	宿泊地
17	移動日：　羽田 - 関空 - ドバイ - カイロ（安村） 関空 - ドバイ - カイロ（小木曽）	機中
18	畑現地参加 中村書記官,北村専門家,進藤 JICA 専門家と打合せ、	カイロ
19	水資源灌漑省（灌漑総局,排水庁,計画局,水質部及び灌漑サービス局参加）表敬、打合せ 大使館表表敬、打合せ JICA エジプト事務所表敬・打合せ	カイロ
20	HCWW 環境庁、水資源省と打合せ、JICA 農業廃棄物処理調査と打合せ	カイロ
21	ファヨーム地区現地調査 集落排水処理施設視察（オランダの援助） 年下水処理施設視察（OD 法・アメリカの援助）	カイロ
22	バハルエルヌール地区現地調査 水資源灌漑省カフルエルシェイク県事務所 バハルエルヌール用水路、支線排水路、NO.4 幹線排水路他視察	カイロ
23	バハルエルヌール地区現地調査 地区内、近傍地区及び周辺地域視察	カイロ
24	資料収集・整理	カイロ
25	資料収集・整理	カイロ
26	水資源灌漑省へ調査報告 日本国大使館へ調査報告 JICA カイロ事務所へ調査報告 畑現地解散	機中
27	移動日　カイロ - ドバイ - 関空 - 羽田（安村） カイロ - ドバイ - 関空（小木曽）	カイロ

(3)面談者リスト

日		訪問先	面談者	役職
7月19日	日	Ministry of Water Resources and Irrigation (MWRI) 水資源灌漑省（関係局合同会議）	別紙参照	
		JICAエジプト事務所	井黒　伸宏	所長
			小森　正勝	次長
			田中　理	所員（農業部門担当）
		大使館	石川　薫	特命全権大使
			中村　康明	一等書記官
20日	月	Holding Company for Water and Wastewater	Eng. Ashraf Yehya Rahel	Planning & Development Adviser
		Egyptian Environmental Affairs Agency (EEAA) （環境庁）	Eng. Said Mostafa	Director of Quality Department and Original Branch Office Sector
			Eng./Ms. Amany Selin	Director of Fresh Water Environmental Quality Sector
			Ms. Fatma	Director of International Conferences and Cooperation between EEAA and Asia Countries
		水資源灌漑省水質局(Water Quality Unit)	Eng./Ms. Mona A Khaleq	Techncial officer
		JICAエジプト事務所(他チームとの情報交換)	小島　浩司	三菱総合研究所（JICA農業廃棄物処理基礎調査チーム）
			三浦　大助	三菱総合研究所（JICA農業廃棄物処理基礎調査チーム）
			奥村　重史	三菱総合研究所（JICA農業廃棄物処理基礎調査チーム）
			佐藤　政良	筑波大学教授
			Fujimaki Haruyuki	筑波大学准教授
21日	火	水資源灌漑省水質局(Water Quality Unit)	Eng. Belal	Technical Officer
		Holding Company for Water and Wastewater Fayoum Drinking Water and Sanitation co.	General Eng. Mahmoud Mohamed Nafei	Chairman
		General Department of Irrigation Advisory Services (IAS) for Fayoum	Eng./Ms. Nagwa Ahmed	General Manager, IAS for Fayoum
			Eng. Mohamed Moktar	Director, IAS for Fayoum
			Ms. Caroline	Consultant for Dutch Project
22日	水	General Department of Irrigation Advisory Services (IAS) for Middle and East Delta	Eng. Ezzat El-Shafie	General Manager, IAS Middle & East Delta
			Eng, Mohamed El-Khiat	Evaluation and Monitoring Staff, IAS Kafr El Sheikh Dept.
			Mr. Doksh	Board Member, Bahr El Nour BCWUA
23日	木	MWRI Gharbeya Irrigation Directorate	Eng. Yasser Salah El-Din	Head of Regional Coordinating Unit of IIIMP
26日	日	水資源灌漑省灌漑総局（Irrigation Department)	Dr. Hussein El-Atfy	Head of Irrigation Department / Deputy Minister
			Prof. Dr. Mohamed Abdel Motaleb	Head of Planning Sector
		JICAエジプト事務所	井黒　伸宏	所長
		大使館	石川　薫	特命全権大使
			中村　康明	一等書記官

MWRI / Joint Meeting with ADCA Mission for Water Quality Improvement Study **19th July 2009**

	Name	Office	Position
1	Mr. Ibrahim Harhash	EPADAP (Egyptian Public Authority for Drainage Projects)	Chairman
2	Mr. Atef El Kashef	CDIAS (Central Department for Irrigation Advisory Service)	Head
3	Ms. Nabila Bahaa	ID (Irrigation Department) Technical Office	General Director of ID (Monitoring & Evaluation Unit)
4	Ms. Mona Abdel Khaleq	WUQ (Water Quality Unit)	Member
5	Mr. Mohammed Ezzat El Shafie	CDIAS Tanta	Member
6	Ms. Taysser Eisa	CDIAS	Member
7	Ms. Nagwa Ahmed	CDIAS Fayoum	Member
8	Mr. Belkies Mortada	Planning Sector	General Director of Work
9	Dr. Koji Kitamura	JICA Expert	
10	Mr. Soji Shindo	JICA Expert	
11	Mr. Yasumura	ADCA Team (Team Leader)	
12	Mr. Sugita	ADCA Team	
13	Mr. Ogiso	ADCA Team	
14	Mr. Hata	ADCA Team	

現　地　写　真　集

バハルエルヌール地区　No.4 幹線排水路：ホテイアオイが繁茂し、一定の排水浄化がなされている（但し、これらが腐敗するまで放置されると新たな汚濁負荷となるので注意が必要である）。

バハルエルヌール地区末端の事業対象排水路：水質を改善し灌漑用水に補給することを地元水利組合が強く要望している。

水路脇に野積みされている家畜糞。水路に投棄され主要な水質汚染源となっている可能性が大きい（バハルエルヌール地区)。

集落の家屋から事業対象排水路に直接垂れ流しとなっている各家屋からの排水（バハルエルヌール地区)。

オランダの資金協力により、水資源灌漑省の水質局がモデル事業として設置した集落排水簡易処理施設。Local Unit が、裨益住民から月 LE10 を徴収、管理人を雇用し運営している。維持管理体制は整っているが、人口規模（2 千人）に対し施設規模が小さすぎ、水質改善効果は低いとみられる(ファヨーム県)。

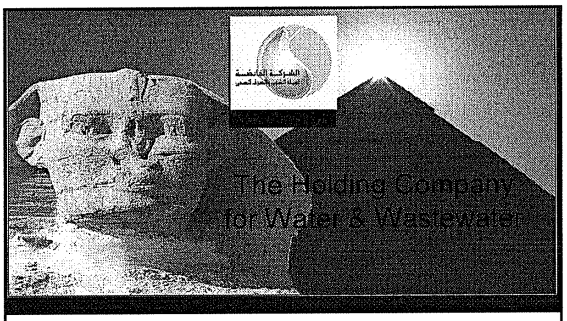
水質検査の様子。今回調査では、要所にて簡易水質検査を実施し、その結果と意味を地元関係者に説明。

添　付　資　料

添付資料１：HCWW（The Holding Company of Water and Wastewater）概要
　エジプト国の上下水道局公社訪問時の説明資料であり、ホールディングカンパニーの業務内容及び今後の上下水道整備計画などがまとめられている。

添付資料２：1982 年法令第 48 号
　エジプト国水資源灌漑局のとりまとめた国内の水質基準を定めた法律である。

添付資料３：排水再利用計画
　排水庁より入手したエジプト国の排水再利用計画について、現況、計画についてとりまとめた資料である。



Ashraf Yehia

Cairo - July 2009

Why Sector Reform was a must:

Challenges facing the Holding and subsidiary companies:

- Low tariffs leading to a weak financial position.
- 14 different organization were responsible for the water sector
- Fragmented Sector Organization.
- Overstaffing.
- Lack of skilled staff in financial and technical fields.
- Weak billing and collection systems.
- Reliance on manual systems.
- Insufficient coordination between concerned organizations.
- Inadequate O&M for the plants and networks.
- Problems with the accuracy of data available.

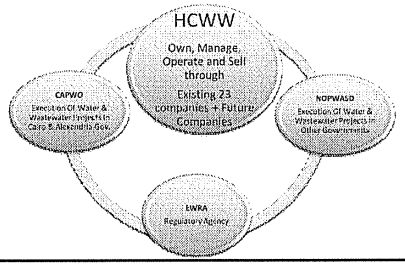
Water and Wastewater Sector reform in Egypt

- **Establishment of the Holding Company by Presidential Decree no. 135 for the year 2004.**
- **The transfer of the municipalities in Egypt into subsidiary companies of the Holding Company.**

After Sector Reform

Established of the Holding Company and the Egyptian Regulatory Agency.

Stakeholders after Reform



Our Mission

Meet Egyptian standards of water and wastewater service through the effective management of subsidiary companies

Our Vision

Achieve world-class levels of water and wastewater service management.

Strategic Goals

- **Provide excellent service for customers**
- **Safeguard and develop infrastructure**
- **Upgrade company performance standards**
- **Develop leaders and staff**
- **Achieve financial autonomy**
- **Upgrade citizen awareness of water issues.**

Our Mandate

- Provide water and sanitation services to 217 cities, 4617 villages and 28000 settlement in Egypt.
- Upgrade the capacity and service standards of newly established operating companies
- Achieve cost recovery of O&M services in the near-term

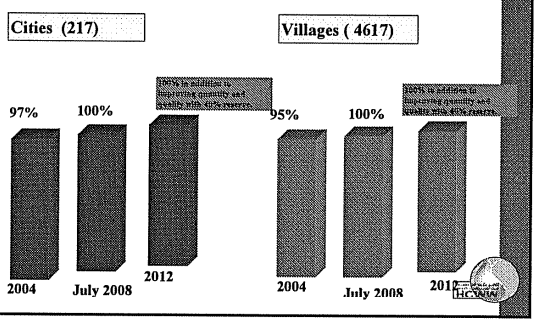
General information about the water and wastewater sector

Item	Current Status
Number of subsidiary companies	23companies
Service region	24 Governorates + Luxor city
Number of customers in water service (millions)	9.5
Number of customers in wastewater service (millions)	4.0
Number of served citizens (millions)	77.0
Number of working people	100,000

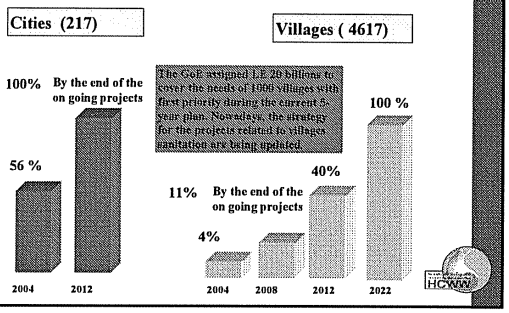
General information about the water and wastewater sectors

Item	Current Status
Water production (millions m3/day)	28
Wastewater treated (millions m3/day)	12
Number of water treatment plants	161 (filtration) + 743 (compact) + 1750 (well plants) +21 (desalination)
Number of wastewater treatment plants	265
Water distribution networks (km)	107,000
Wastewater collection networks (km)	29,000

Water coverage percentage in Egypt



Wastewater coverage percentage in Egypt



WATER & SANITATION COVERAGE

- Nearly 100% water coverage in urban areas
- Only 56% wastewater coverage in cities, expected to increase to 100% by 2012
- Rural areas vastly underserved: 11% presently, 40% by 2012
- LE 20 billion ($3.8 billion) allocated for village wastewater management
- Rural sanitation strategy (underway) calls for full coverage by 2022

CHALLENGES FACING OUR COMPANY

- Legacy of inefficiently-run utilities prior to HCWW launch in 2004
- Tariffs are among the lowest in the world -- as low as LE 0.10 (>$.02) per cubic meter
- Overstaffed operations, yet lacking managerial and technical talents
- Absence of financial accountability and incentives to improve service delivery
- Heavily indebted sector: by the year 2000, utilities had accumulated nearly $1.2 billion in operating deficit and $1.1 billion in debt.

ACHIEVEMENTS SINCE 2004

- Computerized billing and collection systems
- Automated financial management systems (financial and cost accounting, water meter reading, etc.)
- Nationwide public awareness campaigns on water use, conservative, and service pricing
- Installation of asset management software
- Master plans for all operating subsidiaries

OPPORTUNITIES

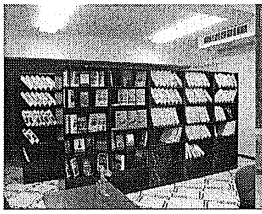
- Sector is high on the GOE agenda
- Strong support by foreign donors
- The sector reforms of 2004 establishing a regulator (EWRA) and an autonomous, commercially-run utility (HCWW) clearly demonstrate GOE commitment
- Five-fold O&M budget increase (LE 0.75 bil.)
- Emergency "crash" investment program of 2007 (LE 2.5 bil.)

PACE OF INSTITUTIONAL DEVELOPMENT

- Improved governance and accountability
- Focus on capacity building, performance improvement and customer service
- Standardization of systems and procedures
- Enhanced information flow
- Establishment of performance indicators and service standards
- Cross fertilization: better operating companies helping weak subsidiaries

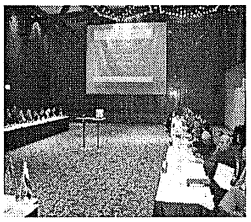
Capacity Building

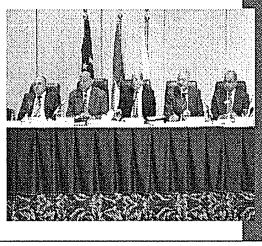
Capacity Building



Training courses and libraries sustained with the newest scientific ensyclopedias.

The program of preparing leaders in the subsidiary companies



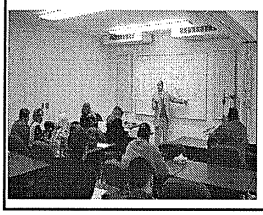


Workshop discussing "Saintation Strategy of Villages" organized by the Holding Company

Training Programs

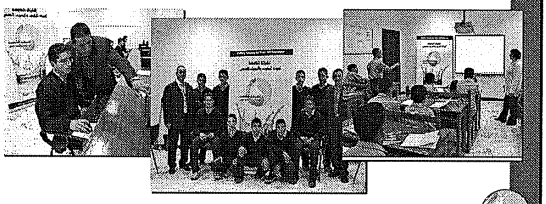
- 1355 training programs were conducted for 15156 trainees during the fiscal year 2007/2008:

Description	Trainees N.	Courses N.
Technical courses	7268	668
Financial courses	1654	111
Administrative Courses	3724	283
Inf.Technology Courses	2470	293



Technical Secondary School

- **First Technical Secondary School for Water and Wastewater was commenced 2008/2009.**



MODERNIZATION INITIATIVES

- A SWAT team and a new organization structure to steer the sector, monitor progress and provide support local utilities.
- Expanded facilities to support an ambitious training and technical assistance.
- Investment in technology: metering, SCADA, automated billing, GIS, water leak detection
- Country-wide master planning
- Introduction of master planning and business planning at the operating company levels

CURRENT INITIATIVES

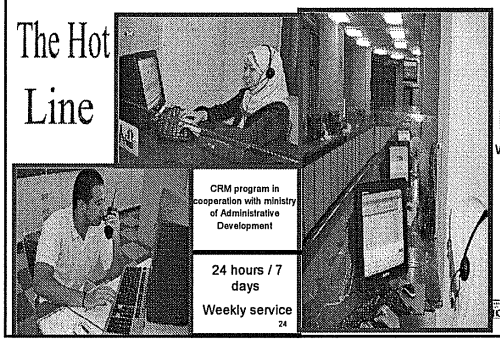
- Establishment of *central and local level* water and wastewater quality testing *labs*
- Water *meter* manufacturing
- *Master plans* for water and wastewater management sector
- Rural sanitation strategy
- *Leak detection* and water loss reduction projects
- Establishment of Supervisory Control and data acquisition System SCADA

SUPPORT TO SUBSIDIARY COMPANIES

- *Technical assistance* in management systems development, automation and financial administration
- Development of *performance standards and indicators*
- Establishment of *service standards* and indicators
- Development of *O&M systems* and plans
- *Human resources* development strategies

CUSTOMER SERVICE: 24X7 HOT LINE

The Hot Line



CRM program in cooperation with ministry of Administrative Development

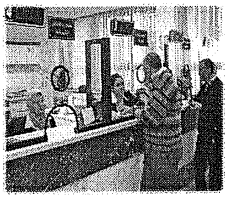
24 hours / 7 days

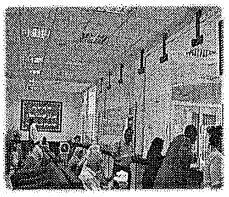
Weekly service

125 Water

175 Wastewater

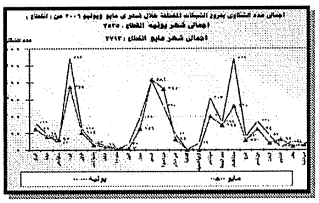
CUSTOMER SERVICE:
MODERN CENTERS WITH TRAINED STAFF





CUSTOMER SERVICE:

Methodology for dealing with complains



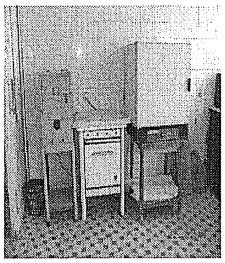
- Technical and engineering analysis for the causes for customer complains to avoid repetition in future.

- Daily follow-up of customer complains through daily reports from affiliated companies to confirm solutions.

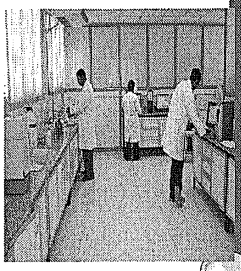
Mobile customer service office

Development of Water and Wastewater Labs

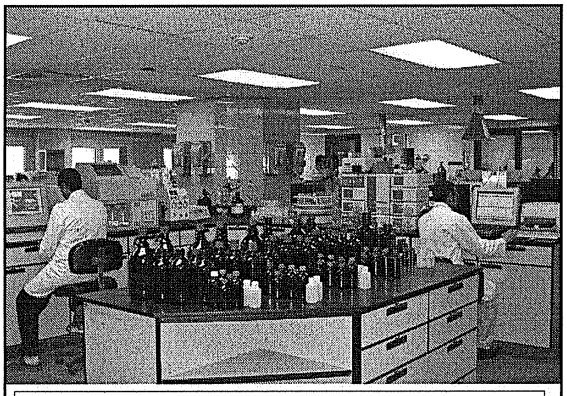
Water Quality Labs



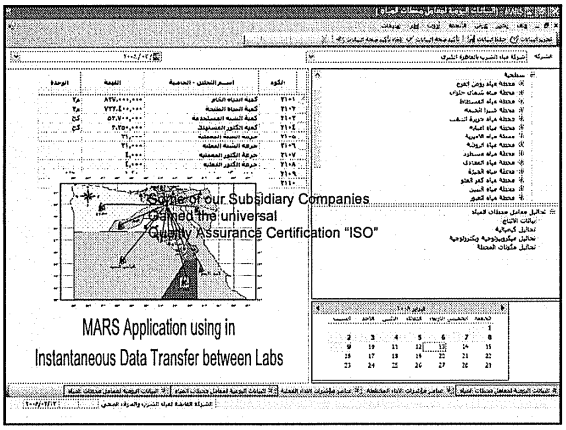
Before



After

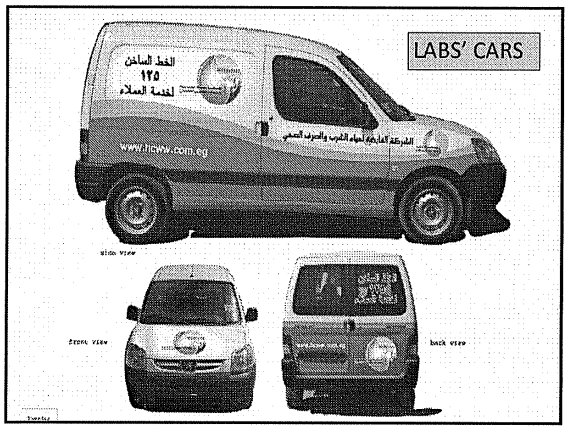


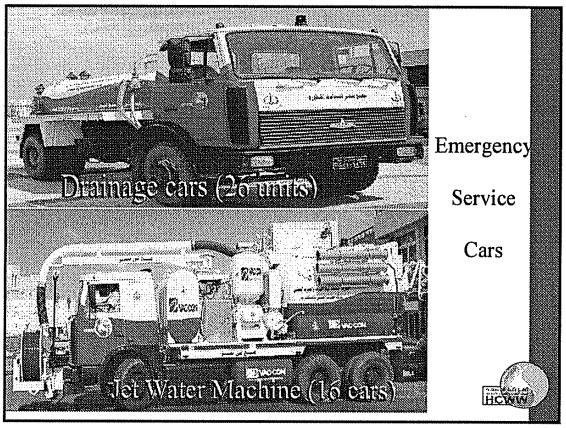
The Central Lab equipped with modern instruments to detect pollution using the most advanced techniques



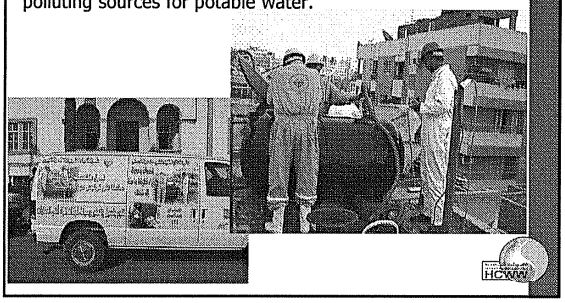
Some of our Subsidiary Companies obtained the universal "Quality Assurance Certification "ISO"

MARS Application using in Instantaneous Data Transfer between Labs





- HCWW established "Cleaning & Maintenance " teams with well equipped cars for water tanks above residential buildings. These tanks are considered to be one of polluting sources for potable water.



MASTER PLAN FOR WATER AND WASTEWATER SECTOR:

- Aim of the master plans is to cover Water & Wastewater needs overall Egypt till 2037, in addition to the high priority projects HPP and studying the different interventions & alternatives of funding.

The Master Plan is being Conducted in Two Phases

- Phase 1: Local consultants will be responsible for the assessment of existing situation and the high priority projects for all governorates.
- Phase 2: International consultants will review all work done by local consultant and develop a Strategic National Master Plan.

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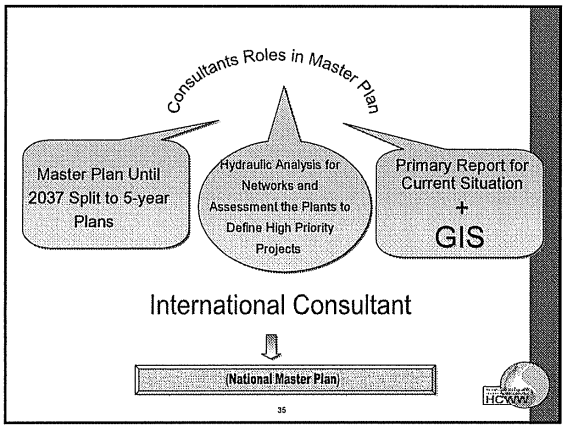

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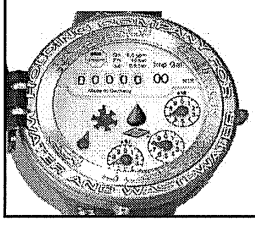
In the Field of Technical Assistance:

Commercial Management by HCWW Corporatization (billing & Collection, Systematic Approach to leak reductions, SCADA System, Water flow Meters, Financial Models, etc.)

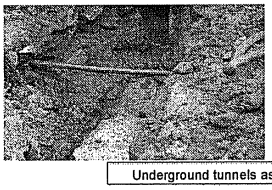
Development of Water Meters Manufacturing :

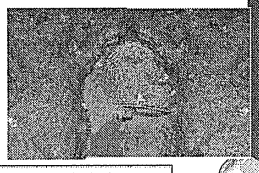


leak Detection

DECREASING UNACCOUNTED FOR WATER AND LEAK DETECTION

•Leakage is considered one of the most important problems facing drinking water networks. It results in the loss of nearly 30% of the total water production.





Underground tunnels as a result of leaked water

37

Using modern techniques

The Holding Company and its subsidiaries are connected together through the electronic site

www.hcww.com.eg

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Geographic Information Systems GIS

⇩

Equip centers with modern programs and devices

⇩

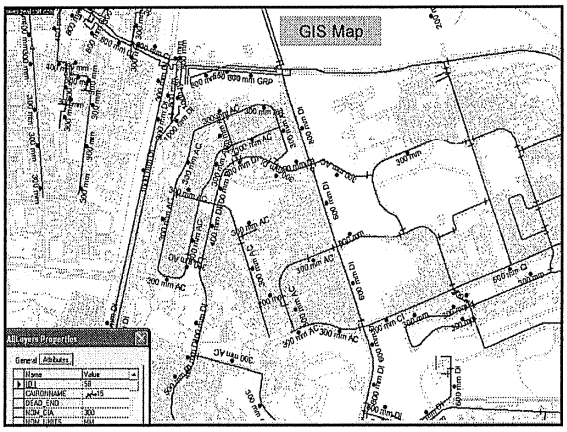
Establishing geographic database at all sector's facilities

Updating data regularly

Connecting the main center with the Holding Company

Participation in maintenece programs and bills issuing systems

30

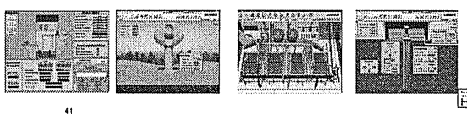


INVESTMENT IN SCADA system

Supervisory Control and data acquisition System SCADA

SCADA system allow you to monitor and control various remote function and processes using modem communication links between master " supervisory center / control room" and remote locations "Plants".

SCADA / Data Acquisition system is generally responsible for collecting data through the control system, and storing it on master computers or servers, or displaying it on terminals.



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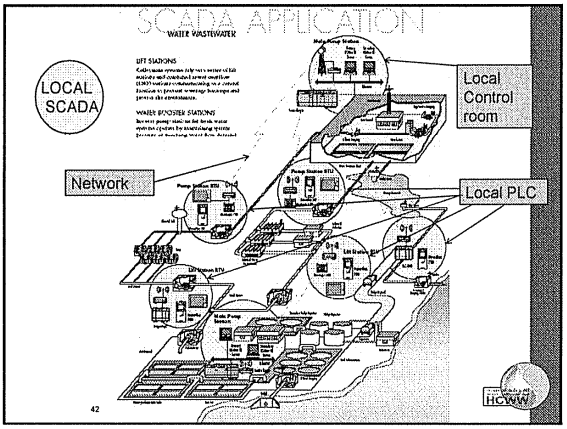

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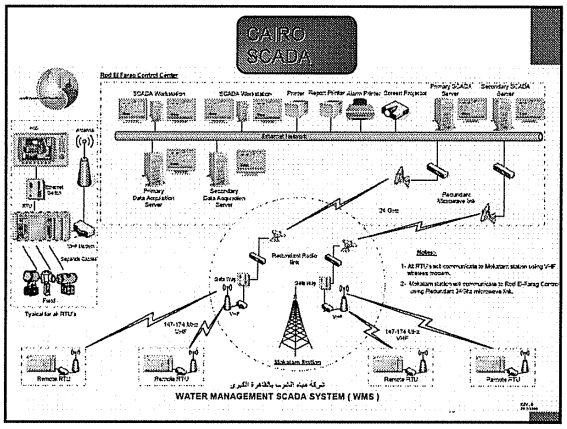
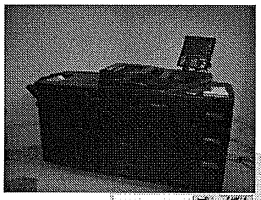
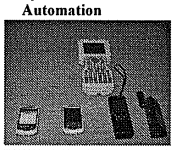


A sample of a bill of Cairo Potable Water Company

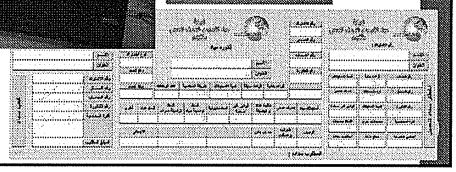
The latest bills printer



Systems Automation



Using handheld Systems



www.hcww.com.eg

- In coordination with the Ministry of Education, material about water conservation were included in school curriculum.

The artistic works and theatre shows of students after being trained on water conversation programs

Co- operation with Donors to provide subsidiaries with Technical Support

Increased Donors Involvement

- Donors Involvement provided institutional, technical and Financial support assisting in reaching all the other achievements
- USAID is funding two new projects expected to run through 2012
- The EU is providing a budget support program for Euro 80 million

- The Dutch continue to work in Fayoum, the MIWR and now the Behiera, Alexandria and Damietta companies
- A European consortium, led by KfW is starting a Euro 300 million project in the Delta
- The World Bank is moving into the first phase of the ISSIP project in the Delta (Behira, Gharbeya, Kafr Elsheikh)

- JICA is providing assistance to Sharqeya Co.
- GTZ has projects in the Holding Company, the Qena Company & MHUUD
- InWent is implementing a year long internship for 8 HCWW middle managers in Germany

REMAINING AGENDA

- Continue investments in HRD and technology
- Raising analytical capabilities at the subsidiary levels and establishing economic analysis units to ensure accurate and timely performance data
- Recovering depreciation and new investment costs
- Consolidating regional master plans and using them as road maps to prioritize investments
- Finalizing and implementing rural sanitation strategy by leveraging GOE investments and donor resources
- Finalizing establishment of Supervisory Control and data acquisition System SCADA at all companies

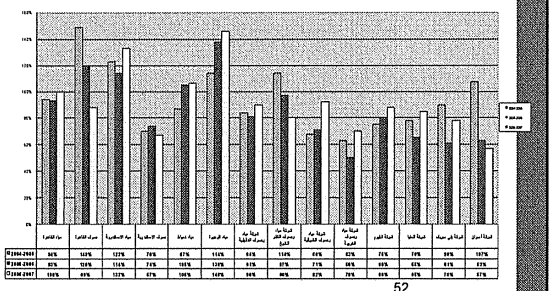
To Achieve Financial Stability Through Three phases

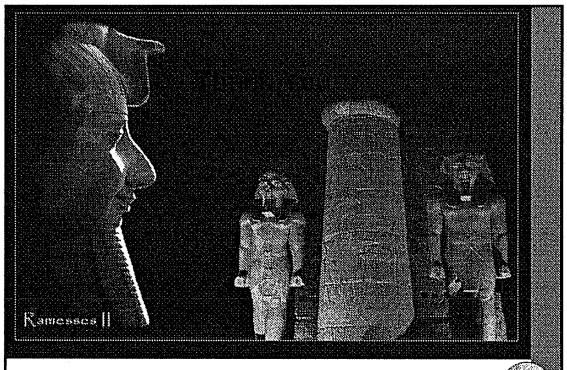
Phase 1: Cover Cost of Operation & Maintenance

Phase II: Cover cost of operation, maintenance and depreciation

Phase II: Cover cost of operation, maintenance and depreciation and Cost of new investment

Covering costs of O & M





The Holding Company for Water & Wastewater

Law 48 for the year 1982
Regarding the Protection of the Nile River and Waterways from Pollution

In the Name of the People

The President

The People's Assembly has adopted the following legislation and we have issued it as follows:

Article 1- In the application of the provisions of this law the following are considered waterways:

A) The freshwater bodies which include:
1- The Nile River, its tributaries and Akhwars.
2- Raiyahat, the canals with all its ranks and Gannabeyat.

B) The saline water bodies which include:
1- Drains with all its ranks.
2- Lakes.
3- Pools, enclosed water entities and Saiahats.

C) Groundwater Reservoirs.

Article 2 - It is prohibited to discharge or cast the solid, liquid or gas wastes discarded from real estate, shops, commercial, industrial and touristic facilities, or from sewage process in the waterways, either along the banks or over the surface unless after receiving license from the Ministry of Irrigation according to the regulations and standards stated in a resolution issued by the Minister of Irrigation based on a proposal by the Minister of Health. The license issued in this respect should include identification of the standards and specifications of each case separately.

Article 3 - The machinery of the Ministry of Health shall conduct a periodic analysis in its laboratories for samples of the processed liquid wastes taken from the facilities licensed to discharge in the waterways in the specified dates besides the analyses demanded by the Ministry of Irrigation in other than those periodic dates.

The machinery of the Ministry of Health shall be responsible for taking and analyzing the samples at the expense of the licensee, who must deposit a sum of money at the Ministry. The money shall be determined according to the quality of the wastes as a debit account of the costs of taking, transferring and analyzing the samples.

Both the Ministry of Irrigation and the licensee shall be informed with the result of the analysis. If the liquid wastes discharged in the waterways are violative of the standards and specifications stipulated in the license and do not constitute an instant danger, the licensee must within three months after being notified adopt a means of treating the wastes in order to be correspondent to the set specifications and standards. The process of treatment and testing should be performed during this period.

If the treatment is not finished by the end of the three-month period or is proved incompetent, the Ministry of Irrigation shall withdraw the given license and stop the discharge in the waterways in the administrative way.

If the result of the analysis shows that it violates the specifications and the standards specified in accordance with the provisions of this law in a way that shall constitute an instant danger to the pollution of the waterways, the licensee shall be notified to remove the causes of the damage immediately. Otherwise the Ministry of Irrigation shall undertake that task at the licensee's expenses or shall withdraw the granted license and stop the discharge done in the waterways in the administrative way.

Article 4 - It shall not be allowed to give permission to establish any facilities that would produce wastes disposed into the waterways.

However, the Ministry of Irrigation excluding any other authority may - if necessary and for the common good – give license to establish these facilities if the authorities using such facilities committed themselves to provide treatment units for these wastes in conformity with the specifications and standards set according to the provisions of this law. The operation of the treatment units should start upon the use of the facilities. The provisions of article 3 of this law shall apply to these facilities.

The existing facilities are to be given a one-year time limit starting from the date of putting this law into effect to provide a means for treating its wastes, otherwise the license shall be withdrawn. In such case the Ministry of Irrigation may take the measures necessary for stopping the discharge in the waterways in the administrative way without breaching the sanctions stated in this law.

Article 5 - The owners of the residential, tourist and other facilities floating in the Nile stream and its branches shall be committed to find a means for treating its wastes or combining them in certain places, draining and casting them in the sewage units. Draining any of its wastes in the Nile or the waterways shall not be allowed.

The irrigation engineers assigned with the application of this law, each in his area of jurisdiction, shall undertake the periodic inspection over these floating facilities. If it turns out that they violate the provisions of this article, the owner of the floating facility shall be given a time limit extending for three months to employ a means for treatment and removal of the causes of the damage. If this is not done by the end of the specified time, the license of the floating facility shall be cancelled.

Article 6 - The Ministry of Irrigation shall be responsible for issuing the licenses for establishing new floating facilities and renewing the licenses of the existing floating facilities, as well as authorizing the establishment of any facilities that would produce wastes to be discharged into the waterways.

Article 7- The movable river units used for transportation, tourism or any other purpose are prohibited to allow the leaking of the fuel used for its operation in the waterways.

The provisions of article 5 of this law shall apply to those units.

Article 8 - The Sanitation Utility shall undertake the task of setting more than one model for units for processing the liquid or adhesive wastes produced by factories, houses, other institutions, floating facilities and river units in a way that would conform to the specifications and standards set according to the provisions of this law.

Article 9 - The license pursuer shall be committed to submit evidence for providing a unit for processing the wastes as well as a certificate from the Sanitation Utility proving the examination of the processing unit and its competency.

Article 10- Upon choosing and using types of chemicals for controlling the plant diseases, the Ministry of Agriculture should maintain that they would not pollute waterways through what is leaked from these chemicals either in a direct way through the process of sprinkling or mixed with the agricultural drainage water or through washing the instruments and equipment used for sprinkling or the containers of pesticides in waterways according to the standards agreed upon among the ministries of Agriculture, Irrigation and Health.

Article 11- Upon choosing types of chemicals used for controlling the water weeds, the Ministry of Irrigation should maintain that they would

not result in polluting waterways, and should in all cases take the necessary precautions before, during and after the processing is done using chemicals, in order to prevent the use of processed water of the waterway until they are certain of the cessation of the effects of these substances on water quality and its usability for all purposes.

Article 12 - Reuse of Drains water shall not be allowed either directly or by mixing with fresh water for any purpose unless it is proven usable for that purpose. The Ministry of Irrigation , after consulting the Ministry of Health, shall take the actions necessary for processing the drains water that are to be reused.

Article 13 - The Nile Water Police Department shall supervise inspection patrols continuing along waterways and assist the competent authorities in controlling the wastes and in eliminating the causes of pollution and report any violations to the provisions of this law.

Article 14 - A special fund shall be instituted to comprise the revenues of charges, fines and costs resultant from the application of the provisions of this law. The money of that fund would be spent on the following cases:

- The costs of the administrative elimination of the violations.
- Monetary aids to the authorities that establish stations for processing the wastes before drainage.
- Conducting laboratory research and studies.
- Rewards for the officials who report and detect crimes violating the provisions of the law.

Article 15 - The Executive regulations for this law shall specify the charges that are due in implementation of the provisions of this law in a way that would not exceed the maximal limits stated in the enclosed table. The regulations shall also determine the expenses that are due in application of the provisions of this law and which may be collected via administrative confiscation.

Article 16 – Without prejudice to the provisions stated in the Penal Code, the punishment stated for violation of the provisions of articles 2, 3, 4, 5, 7 of this law shall be imprisonment for a period not exceeding one year in addition to a fine that shall not be less than five hundred pounds and shall not exceed two thousand pounds or one of these two penalties. If the violation reoccurs, the penalty shall be duplicated. The violator should eliminate or amend the violations at the date set by the Ministry of Irrigation. Unless the violator undertakes the elimination or the amendment of the violation at the specified date, the Ministry of Irrigation shall take the measures needed for the elimination or amendment by the administrative way and at the expense of the violator without breaching the right of the ministry to nullifying the license.

Article 17- The Minister of Irrigation shall issue the executive regulations of this law after consulting the other ministries concerned in three months from the date of issuing.

Article 18 - Irrigation engineers who, via a resolution from the Minister of Justice in agreement with the Minister of Irrigation, shall be designated as investigation officers in relation to the crimes stipulated in this legislation and which occur within their areas of jurisdiction.

Article 19 - This legislation is to be published in the official newspapers, and is to be in force within three months after the date of publication.

This legislation shall be stamped with the State Seal, and is to be implemented as one of its laws.

Issued at the Presidency on 21 June 1982.

Resolution no. 8 of the Minister of Irrigation for the year 1983 concerning the Executive Regulations of Law 48 for the year 1982 regarding the Protection of the Nile and Waterways from Pollution

Section 1
Definitions

Article 1- In the application of the provisions of law 48 for the year 1982, waterways mentioned are defined as follows:

1- The River Nile and its branches : the main stream of the Nile starting from the international boundaries with Sudan till the estuary of Demietta and Rashed branches in the Mediterranean.

2- Al-Akhwar : The side branches of the Nile Stream inside the islands

3-Al-Raiyahat: Large canals transferring water from the Delta Barrages supplying the network of canals in Lower Egypt.

4- Canals: Big and small canals with all its branches even field mesqas.

5- Gannabeyat: Distribution canals that pass parallel or adjacent to main canals transferring irrigation water.

6- Drains: Large and small drains with all its branches even the field drains and covered drains.

7- Lakes: Lakes connected with seas or springs.

8- Pools: Large enclosed water bodies into which waterways flow.

9- Closed water bodies: Lows filled with water and linked to waterways.

10- Saiahat: Low lands around the lakes into which drainage channels flow.

The source of the last three waterways is drainage water.

11- Groundwater reservoirs: Groundwater reservoirs within the Egyptian boundaries.

12- Solid Wastes : All the solid materials either resultant from garbage, sewage, dry wastes, stones, wastes from buildings or workshops, or any solid materials residual after individuals, residential, nonresidential buildings, either governmental or private, whether commercial, industrial, tourist or public as well as means of transportation.

13- Liquid wastes :

(1) Wastes emanating from industrial shops over which the standards regarding the liquid industrial wastes shall be applied.

(2) Human or animal wastes proceeding from the processes of sewage or its networks or from other properties or facilities such as public, commercial, industrial and tourist shops either movable, immovable or floating.

(3) Liquid animal wastes derived from the processes of slaughter, slaughter houses, abattoirs, poultry farms and barns.

14- The word "facility" refers to all the real estates, shops, commercial, industrial or tourist institutions whether governmental or nongovernmental.

Section 2
Licensing to Drain Processed Liquid Wastes in Waterways

Article 2- The banks of water bodies shall not be used - whatever their type - as places for collecting or disposal of solid wastes, transferring or storing volatile substances except for places for which a license is issued from the Ministry of Irrigation based on an application submitted by the party concerned.

Article 3- Storing or discharging chemicals or poisonous substances shall not be permitted at the banks of waterways except in places given prior license in relation to the existing licenses. The renewal of these licenses and issuance of new licenses shall be done by the Ministry of Irrigation.

Article 4- Liquid industrial wastes licensed to be discharged into waterways must not contain any pesticides or radiant substances or substances floating in the waterway... Or any substance that would constitute danger to man, animal, plant, fish, or bird, or would affect water usability for drinking, domestic, industrial, or agricultural uses.

Article 5- Licensing to drain human, animal wastes or sewage water into fresh water bodies, stated in article 1 from law 48 for the year 1982 referred to, or groundwater reservoirs shall not be granted. However the Minister of Irrigation may license draining wastes of movable floating facilities and river units into fresh waterways and groundwater after being processed according to the standards, conditions, and regulations stated as follows on the condition that the owner of floating facility or river unit should pay the charge stated in article 82 from the regulations.

Item	*Standards and Specifications*
Degree of Ionic Concentration of Hydrogen	7-8.5
Temperature	Five degrees above the average.
Color	Free from any colored substances.
Dissolved Oxygen	Not less than 2 milligrams/liter.
Absorbed biotic Oxygen	Not exceeding 20 milligrams/liter.
Chemically consumed oxygen (Permanganate Method)	Not exceeding 30 milligrams/liter.

Chemically consumed oxygen (Dicromate Method)	Not exceeding 60 milligram/liter.
Suspended Substances	Not Exceeding 20 milligram/liter.
Sulfides	Not Exceeding 0.5 milligram/liter.
Oils and greases	Not Exceeding 2 milligram/liter.
Nitrites	None.
Heavy metals group estimated	Not Exceeding 1.5 milligram/liter.
Lead of microscopic examination	Free from eggs of intestinal parasites
Potential number of colonic group	Not Exceeding 100/100 cm^3
Pesticides	None

1- The wastes must be sterilized after processing and before drainage into freshwater ways, Ozone is preferable.

In case of using chlorine or its derivatives, the chlorine left after 20 minutes after being added must not be less than 0.5 milligram/liter and must not exceed 1 milligram/liter.

2- Processing units for movable floating facilities should be designed in a way that provides points for taking samples before drainage. The draining of the slough resultant from processing into the waterway shall be

prohibited. Representatives of the Ministry of Health and Health Affairs Directorates are entitled to access these floating facilities and river units to confirm the operation of purification units and take the necessary samples.

3- The owner of the floating facility or river unit should submit to the Ministry of Health (the Public Department of Environmental Health) the detailed charts for the processing units accompanied with a study of competency and conformity with the specifications stated to get the preliminary approval before the issuance of the license.

4- The draining of processed and sterilized wastes shall take place only during the motion of the floating facility. Draining of processed or unprocessed wastes shall be prohibited during the halting of the floating facilities and river units at the anchorages or stopping in the waterway for any reason whatsoever.

5- Chemicals, oils, operation exhausts, or dry wastes must not be drained into a fresh waterway in any form whether the floating facility or river unit was movable or immovable.

6- Draining of processed or liquid wastes of the floating facilities into waterways should be stopped in case of extreme danger upon the decision of the Minister of Health.

Article 6- Drainage of all liquid industrial wastes or sewage water into fresh water bodies and groundwater reservoirs shall be prohibited. The Ministry of Irrigation may license drainage of liquid industrial wastes which were processed into groundwater reservoirs according to conditions, specifications and standards stated in the regulations.

Article 7- Licensing to discharge water produced through machinery cooling into waterways shall not be granted unless water is taken from the same stream in which it flows or from a similar source at least in terms of

water quality, provided that the cooling circuit should be closed and not mixed with wastes of any phase of the industrial operations. In such case it does not have to be compatible with specifications, and standards concerning discharge of industrial wastes into fresh or saline water bodies except for temperature, oil and grease standards.

Article 8- It is prohibited to discharge any water containing radiant materials in groundwater reservoirs.

Article 9- The pipe of discharging processed liquid wastes licensed to be drained into waterways must be located in an evident place above the water level of the water stream.

Article 10- In case of licensing to discharge processed liquid industrial wastes into waterways it is stipulated that the drainage pipe must be distanced at least 3 kilometers in front of drinking water intakes or one kilometer aback.

Article 11- Water used for washing the filters at drinking water purification stations should not be discharged into water bodies without being processed. The authorities concerned should provide suitable means of processing.

Article 12- The application for the license of discharging processed liquid wastes into waterways shall be submitted to the competent irrigation inspector of the Irrigation District in whose area of jurisdiction the facility is located, the application should be presented with the charge of stamp including the following data:

1. The name, location, and address of the facility.
2. The license issued to the facility or number and date of the license application as well as the approvals issued in its regard.
3. The name of owner of the facility.
4. The activity carried out by the facility.

5. The quality of the liquid wastes requiring a license to be discharged into the waterways.
6. The result of the analysis of a sample taken from these wastes for a period not exceeding three months in case of existing facilities.
7. The name of waterway adjacent to the facility and which may be used for drainage.
8. The charts demonstrating locations for draining the wastes into waterways or ground reservoirs as well as the proposed drainage technique and the necessary specifications.
9. Paying examination fees that amount to 20 Egyptian pounds.
10. Paying insurance fees at the account of the costs of sampling , transferring and analysis in the following categories :

	Type of wastes	Insurance rate
1	Sewage water	200 (two hundred pounds)
2	Liquid industrial wastes	
	(A) drained into fresh water bodies	500 (five hundred pounds)
	(B) drained into saline water bodies	400 (four hundred pounds)

Article 13 - The irrigation engineer in whose area of jurisdiction the facility is located shall undertake the necessary examination and the required technical studies.

Article 14 - The competent irrigation engineer should consult the Ministry of Health regarding the result of the analysis of a sample of liquid wastes requiring a license for drainage or concerning how identical the wastes proposed to discharge are in relation to the standards stated in the regulations.

Article 15 - The Ministry of Health shall undertake the process of taking one sample or more from processed liquid wastes in the scheduled times and shall inform the Ministry of Irrigation with the result of the analysis accompanied with the opinion of Health laboratories concerning the form referred to in article 26 of the regulations.

Article 16 - The license shall be issued by the General Director of the Public Department of Irrigation based on the technical examination and the result of the analysis.

Article 17 - The license issued in this regard shall include the following:

-The number of the license.
-The name and location of the facility.
-The name of the owner of the facility.
- The standards and specifications which should not be exceeded by the quality of the liquid wastes licensed to be drained.
- The name and location of the waterway in which liquid wastes are licensed to drain.
- The amount of liquid wastes licensed to drain into the waterway (m^3/day).
- The number and locations of the licensed drains.
- The duration of the effectiveness of the license.
- The charges that are due annually for the laboratory tests and analysis of samples.

Article 18 - The duration of the license should not exceed two years, and should be renewed at least two months before the expiry date. The license shall be abolished without renewal in case of expiry.

Article 19 - The following authorities shall be given a copy of the granted license:

1- The competent Irrigation Public Department.

2- The pursuer of the license.
3- The Public Department of Environmental Health of the Ministry of Health.
4- The Nile Water Police of the Ministry of Interior.

Article 20 - The Ministry of Irrigation, in case of disapproval of the license application, should inform the person concerned with a registered letter explaining the reasons of rejection within sixty days from the date of submitting the application. The owner of the facility has the right to complain in 15 days since the date of being notified with the rejection of the license.

Article 21- The complaint shall be submitted to the same authority to which the application of the license is presented. The same authority should examine and render a judgment regarding the application within thirty days from the date of receiving the complaint. The judgment shall be conclusive.

Article 22 - The sanctions stated in law 48 for the year 1982 referred to shall apply to any one who violates the conditions of the granted license.

Article 23 - In case of losing or damaging the license, the Irrigation Public Department issuing the license must be notified immediately in order to issue a substitutive license after paying the charges amounting to ten pounds.

Section 3

Monitoring Abidance by the Stipulations of the License

Article 24 - The Ministry of Health shall conduct in its laboratories at least once every three months a periodic analysis for samples of processed liquid wastes taken from the facilities licensed to drain in waterways stated in law 48 for the year 1982 referred to. The samples shall be taken at different times to determine the quality of the wastes in the required accuracy.

Article 25 - The Ministry of Irrigation shall have the right to request the Ministry of Health to take samples from the processed liquid wastes in the dates determined by the Ministry of Irrigation and in other than the periodic dates referred to in the above-mentioned article.

The Ministry of Health shall inform the facility requiring the license with the result of the analysis of these samples accompanied with the opinion of its laboratories.

Article 26 - The Ministry of Health shall apprise both the Ministry of Irrigation and the owner of the facility with the result of the analysis of the sample taken from the processed liquid wastes in a month from the date of taking the sample on a form including the following data:

1- The name and address of the facility.
2- The date and location of taking the samples
3- The hour of taking the sample.
4- The name and address of the laboratory following the Ministry of Health which performed the analysis.
5- The name and occupation of the official who took the sample.
6- The name and occupation of the laboratory official.
7- The result of the analysis in detail and comparing it with the stated standards.
8- The final opinion of the laboratory.

Article 27- If the result of the analysis of the samples turns out to be violating the standards and specifications stipulated in the license in a manner that represents an instant danger to the pollution of waterways, the Ministry of Irrigation shall notify the person concerned by any means possible to remove the causes of the danger of pollution immediately. Otherwise the Ministry of Irrigation shall undertake that task at the expenses of the person concerned.

In that case it is allowed to withdraw the license and stop the drainage in waterways in the administrative way and the police departments as well as the competent local government authorities shall be informed for implementation.

Article 28 - If the result of the analysis of samples taken from the processed liquid wastes turns out to be violating the standards and specifications stipulated in the license in a manner that would not represent an instant danger, the Ministry of Irrigation shall inform the person concerned with a registered letter to remove the causes of violation within three months from the date of notification.

The person concerned is considered aware of the notification since the date of receiving the notification or the date of receiving the result of the analysis of samples from the Ministry of Health.

Article 29 - The Ministry of Irrigation shall advise the Ministry of Health with the measures taken according to the above-mentioned article to assume the task of taking a new sample on the day following the end of the three-month period referred to in the preceding article for analysis and notifying the Ministry of Irrigation with the result of the analysis and the final opinion of the Ministry of Health in this respect according to the form referred to in article (26) in the regulations.

Article 30 - The Ministry of Irrigation shall withdraw the license and halt the drainage into waterways in the administrative way if the processing

does not occur within the three-month period referred to in article 28 or if the result of the reanalysis revealed the incompetence of the processing done by the party concerned.

Article 31 - The owners of permanent or temporary facilities that currently exist and produce wastes drained in waterways shall be committed to inform the Ministry of Irrigation within three months from the date of putting the regulations into effect with a statement including the following:

1- The name and address of the facility.
2- The name of the owner of the facility or the authority that it follows.
3- The activity practiced by the facility.
4- The granted license for establishing the facility.
5- The quality of the wastes that are discharged into the waterway.
6- The name of waterway into which the wastes are cast.
7- The license granted to the facility to discharge its wastes into the waterway.
8- The amount of liquid wastes authorized to be drained into the waterway.

The notification shall be done via a registered letter or by handing it with a receipt to the engineer of the irrigation district in whose area of jurisdiction the facility is located.

Article 32 - The Ministry of Irrigation shall create registers at the level of Irrigation Districts comprising data of the permanent or temporary facilities or the facilities licensed to be established under law 48 for the year 1982 referred to.

Article 33 - The Ministry of Irrigation shall revise the notifications submitted to it in accordance with article (31) by the facilities that currently exist, and the state of their drainage of their liquid wastes into waterways. The Ministry shall also perform the inspection necessary for

the process of draining liquid wastes produced by these facilities, demonstrate her observations regarding every location and send a copy of these data to the Ministry of Health for taking samples from the liquid wastes at the times scheduled by the ministry and conducting the analysis.

Article 34 - The Ministry of Health shall apprise the Irrigation Authority requiring the analysis and the owner of the facility with the result of the analysis of the samples accompanied with the final opinion of the Ministry of Health laboratories in their regard.

Article 35 - The owner of the facility should, within a year from the date of applying law 48 for the year 1982 referred to, provide a means for processing liquid wastes for removing the causes of violation to the stated standards and specifications.

Article 36- By the end of the duration referred to in the above-mentioned article, the Ministry of Health shall perform a new analysis of the samples of the processed liquid wastes from all the existing facilities previously informed with data according to article (33) from the regulations. The Ministry of Health shall apprise the Ministry of Irrigation and the owner of the facility with the result of the analysis and the opinion of the Ministry of Health laboratories in their regard.

Article 37- The Ministry of Irrigation shall withdraw the license and stop the drainage into waterways in the administrative way if the incompetency of the processing of the liquid wastes, conducted by the owner of the facility, is proven after the end of the duration referred to in article (35) from the regulations without prejudice to the sanctions stated in law 48 for the year 1982 referred to.

Article 38 - Starting from the date of the application of law 48 for the year 1982 referred to, the civil service and local government services shall not be allowed to authorize establishing facilities that would produce wastes to be drained in waterways. The Ministry of Irrigation

shall be exclusively responsible for giving the final license for instituting the facilities that would produce drainage wastes in waterways, after the owner of the facility receives approvals from the competent authorities and commits himself to provide units for processing liquid wastes in conformity with the standards and specifications stated in the regulations.

Section 4
About The Floating Facilities and Movable River Units
Chapter 1
About The Floating Facilities

Article 39- In the application of the provisions of article (5) from law 48 for the year 1982, a floating facility means every motorized or non-motorized floating establishment … whether it was residential or touristic…

Article 40- Starting from the date of application of law 48 for the year 1982 referred to, the Ministry of Irrigation shall have the jurisdiction over issuing licenses for establishing the new floating facilities and renewal of licenses of the existing floating facilities after the owner receives approvals from the competent authorities.

Article 41- The application of the license for establishing the facility shall be presented by its owner to the President of the Irrigation Sector of the Ministry in Cairo. The application form must bear the necessary governmental stamps with the following documents enclosed:

1- The document of ownership of the facility.
2- A certificate from the Public Authority for River Transportation proving the usability of the facility and compatibility with the conditions stated by the Authority.
3- A certificate from the Irrigation Engineer in charge proving availability of a unit for processing the wastes resulting from using the facility, his examination of the facility and its competency.

4- Approvals of other competent authorities.
5- The commitment of the owner of the facility of preventing the leaking of the fuel used for operation of the facility into the waterways.
6- The name of the waterway used for operating or berthing the facility.
7- Paying the fees of examination which amount to twenty pounds…

Article 42- The license shall be issued by the competent Irrigation General Director or the Nile Inspector within a month from the date of presenting the application. The granted license should include the following:

- The name of the facility.
- The name of the owner of the facility.
- The activity practiced by the facility.
- The name of the waterway authorized for the use of the facility.
- Commitment of the owner of the facility of preventing the leaking of the fuel used for operation of the facility in the waterways.
- The duration of the effectiveness of the license granted to the facility, which shall be as follows:

1- Three years for the facilities used for residential purposes.
2- One year for the facilities used for touristic purposes.

Article 43 - The application of the renewal of the license shall be presented after applying the measures stated in article 41 from the regulations to the authority issuing the license in three months before the expiry of the existing license.

Article 44 - In case of loss or damage of the license, the Irrigation Public Department or the Nile Inspection issuing the license should be immediately informed and the owner should receive a substitutive license after paying the charges amounting to ten pounds.

Article 45 - The machinery of the Ministry of Irrigation should conduct periodic inspection at least once every three months and when

necessary over the floating facilities anchoring within the district – to confirm its abiding by the conditions of the granted license and providing a means for processing their wastes or collecting them in specific places, draining and casting them away in sewage. If the facilities violated that, the Ministry of Irrigation would inform the owner of the facility with a registered letter to remove the causes of the violation in three months since the date of receiving the notification.

Article 46 - The Irrigation Engineer or Nile Inspector should reexamine the facility by the end of the three-month period in the above-mentioned article. If the processing undertaken by the owner of the facility for removing the causes of the violation is proven to be incompetent, the license of the facility shall be cancelled.

Article 47- The Ministry of Irrigation shall create records at the level of the Irrigation Districts and Nile Inspections comprising all the data stated in the license granted for each facility that anchors or operates at the waterway situated within its boundaries.

Article 48- All the owners of the existing facilities should apprize the Ministry of Irrigation on the date of effectiveness of the regulations, whatever the use of the facility, with a statement including the following:

- The name of the facility.
- The name of the owner of the facility or the authority it follows.
- The activity practiced by the facility.
- The license granted for establishing the facility.

The name of the waterway authorized for use by the facility.

- The quality of the wastes resultant from the use of the facility and the method of disposal.
- The availability of units for processing the wastes before disposal.

- The license given to the facility for draining its wastes in the waterway.

This notification should be sent in a registered letter or is handed by receipt to the competent Engineer of the Irrigation District or the Nile Inspector in whose area of jurisdiction the facility is located within three months from the date of putting the regulations in effect.

Article 49- The Ministry of Irrigation shall revise the notifications submitted by the owners of the existing facilities at the time of applying law 48 for the year 1982 referred to and shall perform an examination of the facilities and methods of processing and drainage of its wastes and shall report its observations regarding every facility, and shall send a copy of all these data to the Ministry of Health and the Sanitation Utility to furnish the Engineer of the Irrigation District or the competent Nile Inspector with the opinion in its regard.

Chapter 2
About the River Units

Article 50- In the application of the provisions of article 7 of law 48 for the year 1982 referred to, the movable River Unit stands for every floating facility in which the machine is a means for its operation even if it consists of a propeller and a propelled device or a trailing and a trailed device whatever is the purpose of its use.

Article 51- The provisions of the articles from 39 to 49 from these regulations shall apply to the movable river units with the exception that the duration of the effectiveness of the license shall be three years.

Article 52- The Nile Water Police following the Ministry of Interior shall assume monitoring floating facilities and the river units which cast their wastes into waterways as well as those which leak the fuel, report the necessary records and notify the Engineer of the Irrigation

District or the Engineer of the Nile Inspection in whose area of jurisdiction the floating facility or the river unit is situated to take the necessary actions according to the provisions of law, carry out the periodic and sudden inspection when these floating facilities and river units are in the anchorages and adopt the necessary measures.

Article 53- The Ministry of Irrigation shall inform the Nile Water Police for detecting the violation, reporting the necessary record and notifying the competent authority in the Ministry of Irrigation for application of the provisions of the law.

Article 54- The Ministry of Irrigation shall inform the Ministry of Health for taking the samples from the liquid wastes that the facility drains into waterways, analyzing the samples and notifying the competent Authority of the Ministry of Irrigation with the result of the analysis accompanied with the opinion of the Ministry of Health laboratories in this regard.

Section 5
About Taking the Samples and Conducting the Analyses

Article 55- Representatives from the Ministries of Irrigation and Health and from the competent Sanitation Utility shall be entitled to access real estates, shops, touristic, industrial and commercial facilities and other institutions that drain their wastes into the water bodies for purposes of taking the samples, and conducting regular and irregular investigation for examining the technique of draining the liquid wastes and the processing units in order to confirm the effectiveness of operation or discovering the wastes.

The owner of the facility should offer the assistance and facilities needed for the completion of their task in the best way possible.

Article 56- The sample should not be less than two liters, the samples are to be put in bottles with sealed smooth glass covers. The containers and the covers should be cleaned well before use. If the samples are taken from liquid wastes treated with chlorine, sterilized containers should be used.

Article 57- The analysis shall take place at the Ministry of Health laboratories immediately after taking the samples. If that is difficult to maintain or if the determined tests are delayed for over three hours, the sample must be kept inside a fridge, with the container surrounded by a layer of ice till the sample reaches the laboratory with some ice left.

Article 58- The sample should be identical to the nature of the liquid wastes as much as possible, and should be taken from a suitable place at the end of the purification process or the final point of connection of the facility wastes or the purification process and from the place where it is drained into the waterways. If the facility has more than one exit for the wastes, the samples should be taken separately from each and every exit. The container should be full and well-plugged after taking the sample. No bubbles or unfilled space should be allowed between the water level inside the container and the plug. While taking the sample, the opening of the container should be placed counter to the current. The sample should neither be taken from the surface nor from the deep water. After filling the container, the opening should be covered by gauze and sealed with wax (or any similar substance) as well as with the signet of the official commissioned to take the sample.

Article 59- The official commissioned with taking the sample should accurately and legibly fill the form specified for that purpose and make the owner of the facility or his representative sign the form. He should send the form immediately with the sample to the Public

Department of the Central Laboratories at the Ministry of Health in Cairo or the provincial laboratories in other governorates.

Section Six
The Regulations, Standards and Specifications regarding the Draining of Processed Liquid Wastes into Waterways

First: Regarding Drainage in Freshwater Bodies:

Article 60- Fresh waterways into which processed liquid industrial wastes are licensed to drain should be kept within the following standards and specifications:

Statement	Standards and Specifications (milligram/liter unless otherwise mentioned)
Colour	Not exceeding 100 degrees
Total solid substances	500
Temperature	Five degrees above the average
Dissolved oxygen	Not less than 5
Hydrogen exponent	Not less than 7 and not exceeding 8.5
Absorbed biotic oxygen	Not exceeding 6
Chemically consumed oxygen	Not exceeding 10
Organic nitrogen	Not exceeding 1
Ammonia	Not exceeding 0.5
Grease and oils	Not exceeding .01
Total Alkalines	Not exceeding 150 and not less than 20
Sulfates	Not exceeding 200
Mercury compounds	Not exceeding 0.001

Iron	Not exceeding 1
Manganese	Not exceeding 0.5
Copper	Not exceeding 1
Zinc	Not exceeding 1
Detergents	Not exceeding 0.5
Nitrates	Not exceeding 45
Fluorides	Not exceeding 0.5
Phenol	Not exceeding 0.02
Arsenic	Not exceeding 0.05
Cadmium	Not exceeding 0.01
Chromium	Not exceeding 0.05
Cyanure	Not exceeding 0.1
Lead	Not exceeding 0.05
Selenium	Not exceeding 0.01

Article 61- The standards concerning licensing for draining the processed liquid industrial wastes into freshwater bodies and groundwater reservoirs as determined by the Ministry of Health are as follows:

(All the standards are milligram/liter unless otherwise mentioned)

Statement	Maximal standards of processed liquid industrial wastes that are drained in	
	The Nile river from the borders of South Egypt till the Delta Barrages	The Nile branch , Rayahat, Canals and Groundwater Reservoirs
Temperature	35	35
Hydrogen exponent	6-9	6-9
Color	Free from colored	Free from colored

	substances	substances
Absorbed biotic oxygen	30	20
Chemically consumed oxygen (Dicromate)	40	30
Chemically consumed oxygen (Permanganate)	15	10
Total soluble solid substances	1200	800
Ash of soluble solid substances	1100	700
Suspended substances	30	30
Ash of suspended substances	20	20
Sulfides	1	1
Oils, greases and resins	5	5
Phosphate (non-organic)	1	1
Nitrates	30	30
Phenol	0.001	0.001

Fluorides	0.5	0.5
Residual chlorine	1	1

Statement	Maximal standards of processed industrial liquid wastes that are drained in	
	The Nile river from the borders of South Egypt till the Delta Barrages	The Nile branch , Rayahat, Canals and Groundwater Reservoirs
Heavy metals group which includes (×)	1	1
× Mercury	0.001	0.001
× Lead	0.05	0.05
× Cadmium	0.01	0.01
× Arsenic	0.05	0.05
× Chromium	0.05	0.05
× Copper	1	1
× Nickel	0.1	0.1
× Iron	1	1
Manganese	0.5	0.5

Zinc	1	1
Silver	0.5	0.5
Detergents	0.05	0.05
Potential number of the colonic group in 100 cm^3	2500	2500

Article 62- The Ministry of Irrigation has the right to disregard some of the standards referred to in the above-mentioned article without prejudice to the provisions of the regulations. That may apply to the cases where the amount of processed liquid industrial wastes drained into freshwater bodies are less than one hundred cubic meter per day on condition that it does not exceed the measurements set in the following table:

Statement	Maximal standards of processed liquid industrial wastes that are drained in	
	The Nile river from the borders of South Egypt till the Delta Barrages	The Nile branch , Rayahat, Canals and Groundwater Reservoirs
Absorbed biotic oxygen	40	30
Chemically consumed oxygen (Diacromat)	60	40
Chemically consumed	20	15

oxygen (permanganate)		
Total solid substances	1500	1000
Ash of solid substances	1000	900
Suspended substances	40	30
Oils, greases and resins	10	10
Nitrates	40	30
Phenol	0.005	0.002

Article 63- The processed liquid industrial wastes licensed to be drained into freshwater bodies must not be mixed with human or animal wastes.

Article 64- In implementation of the provisions of law 48 for the year 1982 referred to, the legislations organizing the standards regarding radiations and radiant substances shall be applied to make sure that they are in conformity with the liquid industrial wastes before draining them into freshwater bodies.

Article 65- The drains water before being pumped into freshwater bodies should fulfill the following standards:

statement	Standards(milligram/liter unless otherwise mentioned)
Color	Not exceeding 100 unit
Total solid substances	500
Temperature	5 Celsius
Odor	Free from colored substances
Dissolved oxygen	Not less than 5
Hydrogen exponent	Not less than 7 and not exceeding 8.5
Absorbed biotic oxygen	Not exceeding 10
Chemically consumed oxygen (Dicromate)	Not exceeding 15
Chemically consumed oxygen (permanganate)	Not exceeding 6
Ammonia	Not exceeding 0.05
Oils or greases	Not exceeding 1
Alkalines	Not exceeding 200 and not less than 50
Mercury compounds	Not exceeding 0.001

Iron	Not exceeding 1
Manganese	Not exceeding 1.5
Copper	Not exceeding 1
Zink	Not exceeding 1
Detergents	Not exceeding 0.5
Nitrates	Not exceeding 45
Fluorides	Not exceeding 0.5
Phenol	Not exceeding 0.02
Arsenic	Not exceeding 0.05
Cadmium	Not exceeding 0.01
Chromium	Not exceeding 0.01
Cyanide	Not exceeding 0.1
Tannin and lignite	Not exceeding 0.5 milligram/liter
Phosphate	Not exceeding 1 milligram/liter
Carbon-chloroform abstracts	Not exceeding 1.50 gram/liter
Potential number of the colonic group 100 C^3	5000

Second: Regarding Draining into Saline Water Bodies:

Article 66: The sewage water and liquid industrial wastes licensed to be drained into saline water bodies should fulfill the following standards and specifications:

Statement	Maximal Standards and Specifications (milligram/liter unless otherwise mentioned)	
	Sewage water	Liquid industrial wastes
Temperature	35 Celsius	35 Celsius
Hydrogen exponent	6-9	6-9
Absorbed biotic oxygen	60	60
Chemically consumed oxygen(Dicromate)	80	100
Chemically consumed oxygen(Permanganate)	40	50
Dissolved oxygen	Not less than 4	-
Oils and greases	10	10
Dissolved substances	2000	2000
Suspended substances	50	60
Colored substances	Free from colored substances	Free from colored substances
Sulfides	1	1
Cyanide	-	0.1
Phosphate	-	10
Nitrates	50	40
Fluorides	-	0.5
Phenol	-	0.005
Total heavy metals	1	1

Pesticides Potential number of the colonic group 100 C^3	None 5000	None 5000

Article 67- In case of draining the sewage water or liquid industrial wastes mixed with sewage water into saline water bodies, based on a request by the competent Health Authority, drained water should be processed with chlorine for purification before drainage so that the chlorine remaining in it after twenty minutes from adding should not be less than 0.50 milligrams. The devices and materials used for purification should be available and ready for action continuously for performing the processing upon request.

Article 68- Saline water bodies into which liquid industrial wastes are licensed to drain should remain within the limits of the following standards and specifications:

Statement	Standards and specifications
Temperature	Not exceeding 5 Celsius above the average
Dissolved oxygen	Not less than 4 milligrams/liter at any time
Hydrogen exponent	Not less than 7 and not exceeding 8.5
Detergents	Not exceeding 0.5 milligram/liter
Phenol	Not exceeding 0.005 milligram/liter
Sediments	Not exceeding 50 units

Soluble solid substances	Not exceeding 650 milligram/liter
Potential number of the colonic group in 100 C3	Not exceeding 5000

Article 69- In case the liquid wastes are drained into the lakes – the number of the colonic bacteria in fish traps should not exceed (70) per 100 cm^3, and does not exceed (230) per 100 cm^3 in tenth of the samples taken from the lakes water at fishing season, for fish conservation and preventing the effects of draining that these wastes may have on fish traps.

Section 7
The Fund of the Revenue of Charges and Fines

Article 70- In application of the provisions of article 14 of law 48 for the year 1982 a special fund shall be created with a special account in the Egyptian Central Bank under the name" The fund of charges and fines of law 48 for the year 1982 regarding the protection of the Nile river and waterways from pollution".

Article 71- The revenue of the charges, fines and costs resultant from the implementation of the provisions of law 48 for the year 1982 referred to shall go to the above-mentioned fund.

Article 72- The board of directors of the fund shall be selected via a resolution by the Minister of Irrigation, and shall convene at least once every month.

Article 73- The board of directors shall undertake the responsibility of drawing the policy of the fund, follow-up of the actions, and formulating the systems and measures necessary for accomplishing those actions.

Article 74- The budget of the fund including the collected revenues and the expenditures shall be prepared and reviewed by the board of directors long enough before the beginning of the fiscal year and should be approved by the Minister of Irrigation.

At the end of the fiscal year the final account of the fund shall be prepared to be ratified by the board of directors in preparation of review for the Accounts Monitoring at the Central Auditing Organization.

Article 75- The board of directors shall formulate its own measures without being restricted by the governmental laws and regulations and shall be ratified by the Minister of Irrigation.

Article 76- <u>The revenues of the fund shall comprise the following:</u>

a) The charges of issuing the licenses and insurances regarding establishing any facilities that would produce wastes to be drained in waterways.
b) The charges of issuing the licenses and insurances regarding establishing new floating facilities and river units and renewal of the licenses of existing floating facilities and units.
c) The value of violations and fines stipulated in article 16 from law 48 for the year 1982 referred to.
d) Other revenues that shall be collected via application of law 48 for the year 1982 referred to.
e) Credits and monetary aids designated by the government as a subsidy for the fund's revenues.
f) The grants, donations and legacies that may be accepted by the Minister of Irrigation.

Article 77- The yields of the fund are spent according to the regulations formulated by the board of directors and shall include particularly the following:

a) The costs of the administrative removal of the wastes.
b) The monetary aids for the authorities establishing units for processing the wastes before drainage.
c) The costs of conducting laboratories analyses, researches and studies.
d) The rewards given to the workers who exert unusual efforts in the operations of detection and removal of the wastes.
e) The rewards given to the officials responsible for reporting and detecting the crimes violating the provisions of law 48 for the year 1982 referred to.
f) The wages of occasional workers whose services are needed in removing the wastes or any other tasks required for the implementation of law 48 for the year 1982 referred to.

Article 78- The Public Departments of the Irrigation Authority shall assume collecting those charges and dues, and depositing them in the Fund's account. The charges and due expenditures, in implementation of the provisions of this law may be levied by way of administrative confiscation.

Article 79- The board of directors shall specify the rewards for the officials responsible for reporting and detecting the crimes with a ratio of the value of the collected fine, as well as its minimal and maximal level, and the measures for spending.

Article 80- The holders of the licenses for draining the processed liquid wastes into waterways shall be informed annually in July with a

statement including the amounts due for charges, laboratory analyses, expenditures, fines and costs of removal done throughout the year.

Section 8

General Provisions

Article 81- The owners of the facilities licensed to drain their processed liquid wastes into waterways shall be committed to deposit insurance at the Irrigation Authority Fund as a guarantee of applying the provisions of article 16 of law 48 for the year 1982 referred to in accordance with the following:

a) One thousand pounds for every facility that employs a pipe whose diameter is not more than twenty centimeters or several pipes with the same amount of drainage for the purpose of draining its processed liquid wastes into waterways.
b) Two thousand pounds for every facility that employs a pipe whose diameter reaches or exceeds twenty centimeters for draining its processed liquid wastes into the waterways.

The value of the fine as well as the costs of the removal shall be deducted from the insurance upon violation if the violator did not pay the value of the fine and costs of removal. The owner of the facility shall be committed to complete the sum of the insurance in two months from the date of notification by discounting the determined value of the fine and the costs of removal.

The receipt of depositing the insurance money is considered one of the documents necessary for obtaining or renewing the license.

The insurance shall be paid back at the expiry of the license unless the licensee is indebted to the Irrigation Authority with any other money.

Article 82- For accessibility to waterways, one piaster is annually charged for every cubic meter of processed liquid wastes licensed to be drained into waterways. The revenues of that charge shall be deposited in the Irrigation Authority Fund in the Ministry of Public Works and Water Resources.

Article 83- This resolution shall be published in the Egyptian Official Gazette, and shall be effective starting from the date of publication.

Written on 17 January 1983.

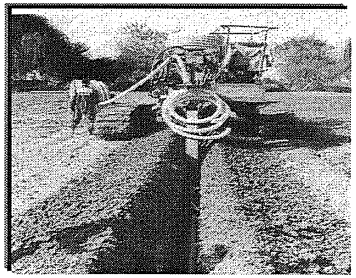
The Minister of Irrigation
Engineer\ Mohamed Abdel-Hady Samaha

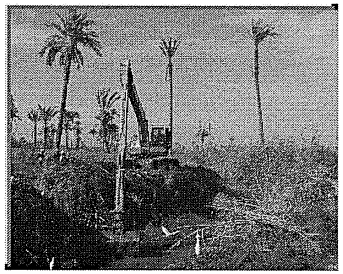
Drainage water reuse

Eng. Ibrahim Harhash
Chairman of
Egyption Public Authority for Drainage Projects EPADP

EPADP Responsibility

➢ **The Egyptian Public Authority for Drainage Projects (EPADP), within the MWRI, is responsible for the implementation of drainage projects and the operation & maintenance of the drainage system. The main function of the drainage system is to control groundwater levels and soil salinity in the agricultural lands in Egypt.**





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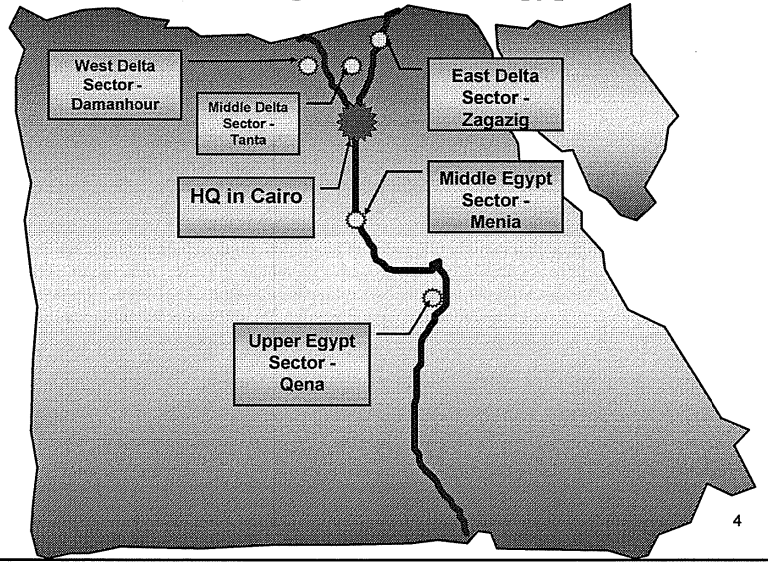
Drainage Sectors in Egypt



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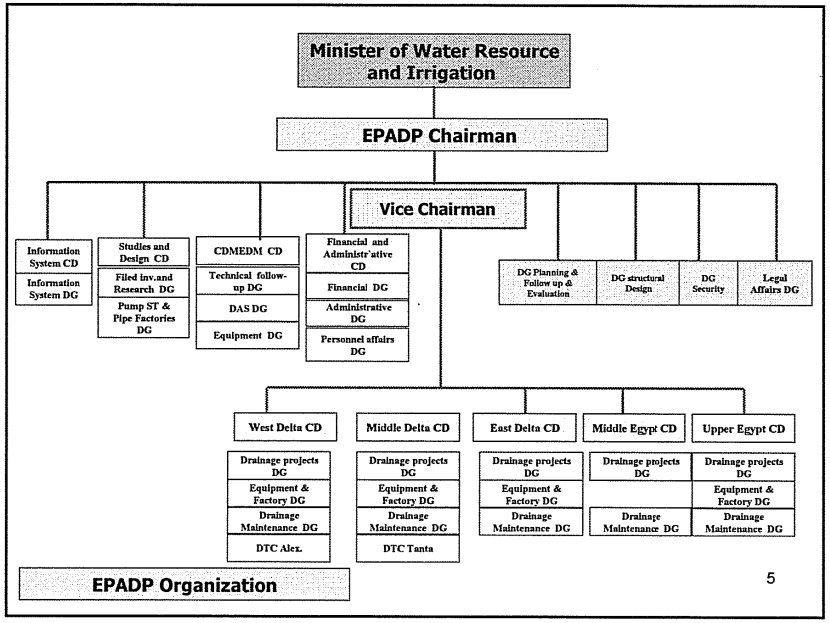


Open Drains Functions

- Open drains have been designed to receive agricultural drainage water and transport it to its destination. Open drains in Upper Egypt discharge their water back again into the Nile, while open drains in the Delta discharge their water either into the Mediterranean sea or the northern coastal lakes, and others drains discharge their water into Domyat and Rasheed branches and main canals. With the need for more irrigation water agricultural drainage-water from selected drains is pumped into irrigation canals through re-use pumping stations.

- EPADP responsible for The agricultural drainage network in Egypt which has over 21,500 km of open drains and carries about 13 billion M^3 / year drainage water.

Pollution of Drainage Water

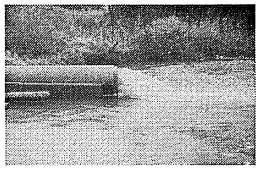
- Open drains have been misused by many of the residents in villages and towns as these drains cross these residential areas. Direct connections of domestic sewage have been illegally extended and evacuations of septic tanks are frequently dumped into open drains. In addition, industrial wastewater is discharged either untreated wastewater to open drains.
- Presently many open drains are carrying a mixture of agricultural drainage water, sewage, industrial wastewater, and solid waste. Some of the re-use pumping stations have been stopped because of the decrease of their water quality as a result of these external pollution sources.

Drainage Water pollutants

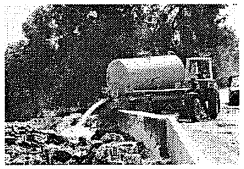
Pollution of the agricultural drains water

- Absence of a well-functioning management system for collection solid and liquid waste from the villages.
- Residents dispose their solid and liquid Wastes into drains.

Solid waste



Industrial waste



Sewage waste

Drainage Water Reuse in the Nile Delta

- **The total quantity of the officially reused drainage water increased from 6.196 billion m3/year in 2005 / 2006 to 6.576 billion m3 / year in 2006 / 2007.**

And this reused quantity reached to 6.85 billion m3/year in 2007 / 2008.

Reuse of Drainage Water in the Nile Delta during 2007 / 2008

Delta region	Discharge billion m3 / day
Eastern Delta	2.84
Middle Delta	3.19
Western Delta	0.82
Total Delta	6.85

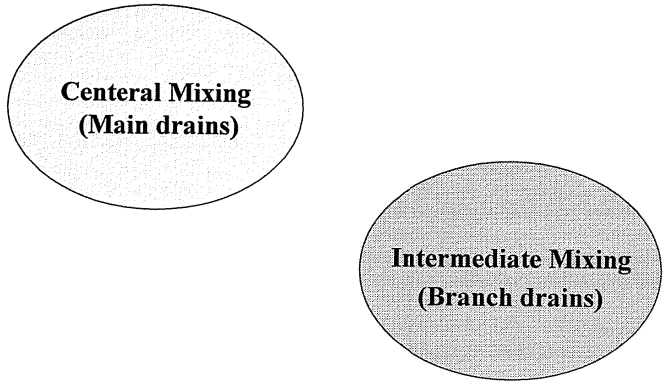
* Drainage water status in the Nile Delta DRI Technical report 2007 / 2008

- **There are unofficiall quantity used by framers direct from drains because of shortage of irrigation water, and another quantity discharged directly in the Nile in Upper Egypt drains.**
- **EPADP attempt to increase the total quantity of reused drainage water in year 2017 to 8.5 billion m3**

Drainage water reuse criteria

- **Drainage water salinity.**
- **Sodium concentration in drainage water.**
- **Pollution loads of sewage and industrial wastes and its influence in drainage water quality.**
- **Drainage status.**
- **Irrigation methods in the area.**
- **Crops pattern, and the ability to resist the salinity.**

Mixing Types



Centeral Mixing (main drains)

- A method to reuse drainage water with high salinity concentration
- The mixing ratios between the drainage water and the fresh irrigation water are 1 : 1 or 1 : 2
- EL Salam Canal one of the biggest projects which mixing drainage water from Hados & EL Serow drains and Domyate Branch with mixing ratio 1 : 1
- There are many mixing sites in the Delta governorates

Intermediate Reuse (Branch drains)

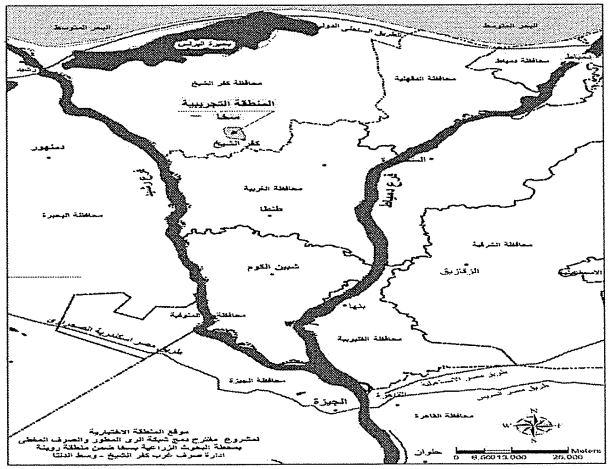
- **There are two concept to reuse agriculture drainage water:**

1- Intermediate drain reuse where, drainage water is lifted from branch drains, before it is polluted with sewage and industrial wastes, and mixed with the irrigation water in branch canals with a good water quality.

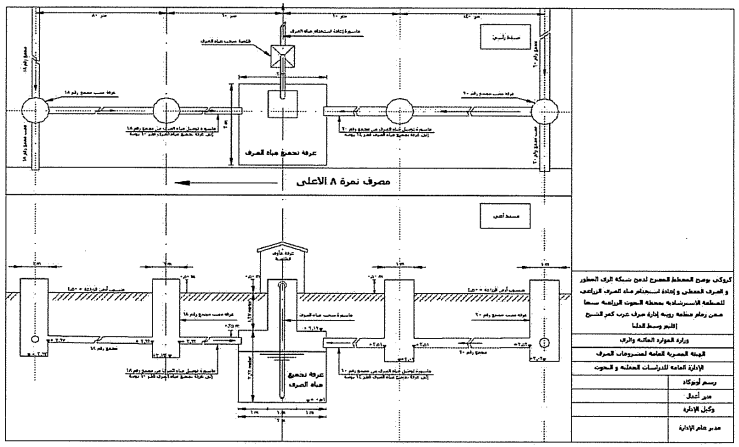
2- Local drainage reuse where, drainage water is lifted from subsurface drainage collectors into collected tank, then lifted to the another collecting tank at the improved Mesqa inlet.

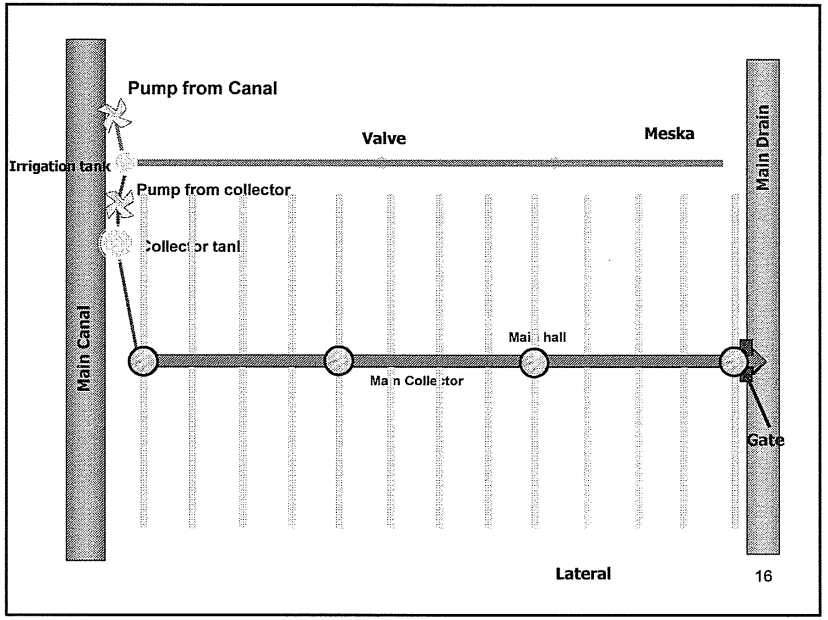
The ratio of mixing is 75 % from Masqa water to 25 % from subsurface collector water, EPADP will apply this system in two areas under IIIMP (Sakhaa in Kafer El Sheikh governorate & EL-Lawiya im El-Behira governorate)

Local Drainage Reuse Tested Area



Local Drainage Reuse





Advantages of Intermediate Drainage Reuse

- maximize the agricultural drainage water re-use.
- It is less sensitive to failure (smaller pumps, easier and faster to repair or replace).
- Increase the crop yield in the areas which suffer from shortage in irrigation water, and increase farmers income .
- The probability of stopping this system is lower than others systems for drainage water reuse, because the water quality is suitable for mixing with irrigation water

Suggested Studies to Improve Drainage Water Quality

Environmental Unit within EPADP prepared some studies to improve water quality in the open drains to maximize the re-use of agricultural drainage water EPADP attempt to apply these studies in the followed areas as a pilot projects:

- In-stream wetland in EL khadrawiya drain.
- Solid and Liquid wastes management system in El Baslakon village
- Re-operate EL Omoum drain mixing Pump station.
- Drain Self-purification in Shopra Malakn drain

Thank you

Overall Goal

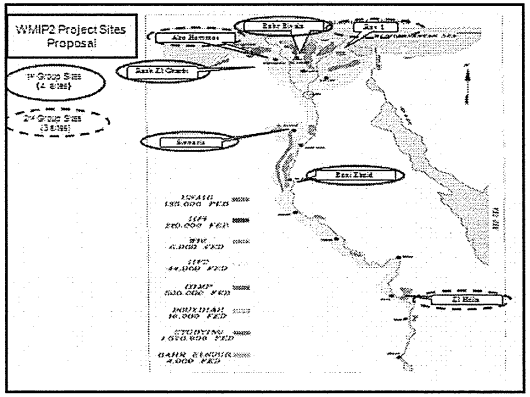
- WUOs at the district, branch canal and mesqa levels are technically, organizationally and financially self-operational nationwide to meet the national agenda of efficient water resource management.

Project Purpose

- The capacity of CDIAS staff is enhanced to be able to establish and strengthen WUOs nationwide.

Water Management Improvement Project-II

WMIP-II



Pilot area and Target group

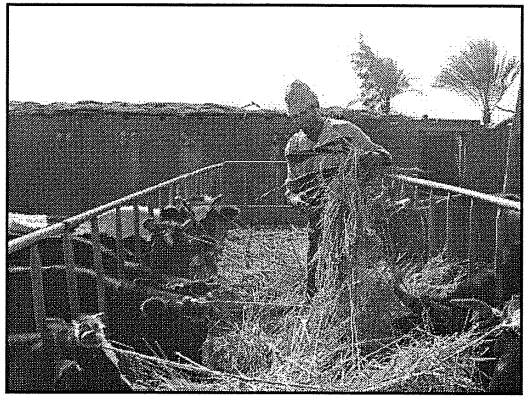
- **Project area**: (two groups of pilot sites)
  - 1st Group (4 pilot sites) and,
  - 2nd Group (3 pilot sites), the Whole Egypt
- **Target group**:
  - CDIAS Staff (direct target),
  - WUOs (indirect target)
  - Relevant stakeholders(indirect target)

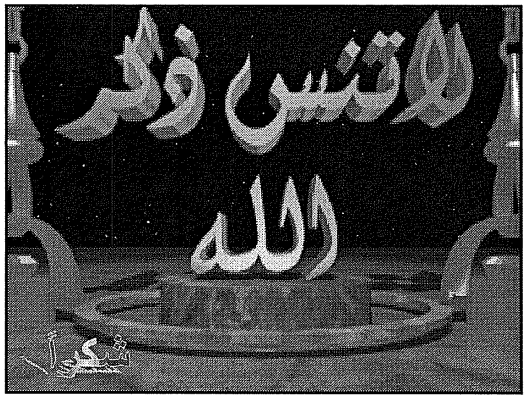
Outputs

Output 1: Ideal forms and functions of WUOs at the different levels are identified for the realization of proper district-based integrated water resource management.

Output 2: Methods of strengthening WUOs are developed for the realization of proper district-based integrated water resource management.

Output 3: Institutions are built nationwide among the government agencies for strengthening WUOs in the country.

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