WATER AND SANITATION
FOR HEALTH PROJECT

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DEVELOPMENT OF A NATIONAL STRATEGY FOR SEWAGE DISPOSAL IN TUNISIA PHASE I

WASH FIELD REPORT NO. 249

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Prepared for
Regional Housing and Urban Development Office,
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WASH Activity No. 456

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PHASE I

Prepared for Regional Housing and
Urban Development Office,
U.S. Agency for International Development,
under WASH Activity No. 456

by

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ACRONYMS

ANPE	Agence nationale de protection de l'environnement (National Agency for Environmental Health)
ARRU	Agence pour la réhabilitation et la rénovation urbaines (Urban Renewal Agency)
CNA	Commission nationale de l'assainissement (National Sanitation Commission)
GOT	Government of Tunisia
MOPWH	Ministry of Public Works and Housing
MOPH	Ministry of Public Health
ONAS	Office national de l'assainissement (National Sanitation Office of Tunisia)
RHUDO	Regional Housing and Urban Development Office (USAID)
SNIT	Société nationale immoblière tunisienne (National Housing Authority of Tunisia)
SONEDE	Société nationale d'exploitation et de distribution des eaux (National Water Supply Company)
TD	Tunisian Dinar (1 TD = U.S. $.89)
USAID	U.S. Agency for International Development
WASH	Water and Sanitation for Health Project

EXECUTIVE SUMMARY

At the request of the USAID Regional Housing and Urban Development Office (RHUDO) in Tunis, The Water and Sanitation for Health (WASH) Project conducted an exploratory study with the goal of elaborating a national strategy on the subject of sewage disposal in areas not served by the Tunisian National Office of Sanitation (ONAS).

Specifically, the purpose of this exploratory study was to assess the sewage disposal situation in urban areas not served by ONAS and establish a process for formulating a national sewage disposal strategy for the development and promulgation of alternative disposal methods in Tunisia. The objectives of the exploratory study were to:

- diagnose sewage disposal alternatives that are currently used in Tunisia,
- recommend a process to the Ministry of Public Works and Housing (MOPWH) for formulating a national sewage disposal strategy for Tunisia, and
- refine and develop in detail the scope of work for follow-up interventions by the WASH Project.

Implementation Methodology

WASH provided a senior sanitary engineer who spent approximately three weeks (two weeks in Tunisia) implementing and reporting on the exploratory study in Phase I. The methodology used in implementing this phase included:

- Attend briefings on the assignment at RHUDO and the MOPWH, clarify and complete the scope of work, and agree on a work plan for Phases II and III.
- Collect and review existing documentation on the sewage disposal sector in Tunisia.
- Meet with key representatives of public sector institutions involved with or responsible for sewage disposal management at central, regional, and municipal levels.
- Meet with private businesses presently involved in providing sanitation services in Tunis, Nabeul,

and Sfax to assess issues, problems, and interest in investing to service the sector.

- Conduct selected site visits to assess the state of the art of sewage disposal in the country.
- Meet with educational institutions to assess their present and potential future role in research and development activities in the sewage disposal sector.
- Design and obtain approval of process and schedule for the formulation of a national sewage disposal strategy.

Outcomes

The most important outcomes of Phase I (exploratory study) of this assignment were as follows:

- Agreement by all parties on the scope of work for all phases of the assignment.
- Clear understanding and acceptance of the study by the Tunisian community intervening in the sewage disposal sector.
- Development and approval of a clear process for formulation of a national sewage disposal strategy with WASH assistance.
- Support from all sectors involved in sewage disposal management in Tunisia.

Conclusions/Recommendations

Over the past ten years, Tunisia has experienced appreciable socio-economic growth and development in all sectors. This growth and development has had a significant impact on the national sewage disposal program, particularly by the construction of new housing units, thus extending urban areas, and the rapid extension of piped distribution systems to population centers of less than 250 inhabitants.

The key sector objectives of the Government of Tunisia are to have all municipal sewage disposal services managed by one national authority (ONAS) and to achieve the same population coverage as piped water systems. Those objectives cannot be achieved in the near term. On the other hand, continued urban growth requires costly extension of existing sewerage systems including their recalibration and renewal. On the other hand, there is still a large number of

important municipalities not handled by ONAS or particular areas in municipalities under ONAS which do not have sewage disposal systems.

Thus, in order to address critical sewage pollution problems which threaten the economy and quality of life of Tunisians, new alternatives must be developed in light of a nationally acceptable and implementable sewage disposal strategy. Such a strategy must identify and promote appropriate technologies as well as develop support systems to sustain these technologies.

This will require the Government of Tunisia to make the political commitment necessary to develop a national sewage strategy. This strategy should be formulated by Tunisian experts with the assistance of external consultants. Implementable strategies on coverage, applied technologies, operations and maintenance, sector organization (public and private), human resource development, community mobilization and participation, applied research and development, and sector financing will need to be fully formulated. Finally, a workshop is proposed to review and adopt the proposed national strategy.

The WASH Project will provide technical assistance in all aspects of strategy formulation as well as the preparation and conduct of the workshop.

Chapter 1

INTRODUCTION

1.1 Scope of Work

The Ministry of Public Works and Housing (MOPWH) of the Government of Tunisia (GOT) made a request to the U.S. Agency for International Development (USAID) for assistance in addressing the country's need to develop a national strategy on alternative methods for sewage disposal in areas that are not served by the National Sanitation Office of Tunisia (ONAS). In response to this request, the USAID Regional Housing and Urban Development Office (RHUDO) requested assistance from the Water and Sanitation for Health (WASH) Project. RHUDO specifically requested that WASH (a) implement a study that would examine alternatives for sewage disposal in the areas not covered by ONAS, (b) select appropriate sewage disposal methods, and (c) set forth a strategy to promulgate and implement the alternative sewage disposal methods selected (see Appendix A, "Scope of Work").

RHUDO and WASH agreed to implement the scope of work in two phases. During Phase I WASH was to:

- undertake a diagnostic study of sewage disposal alternatives that are currently used in Tunisia outside the ONAS service area,
- recommend low cost alternative methods that would be suitable for different environmental conditions in areas not served by ONAS,
- begin an interactive process with the Tunisian authorities in order to provide preliminary information and suggestions in support of the proposed alternative methods, and
- refine and develop in detail how WASH and assigned Tunisian experts would jointly develop a detailed strategy to promulgate and implement the selected alternatives during Phase II. The detailed strategy, or scope of work, was to include plans for developing technical specifications, norms, and standards; institutional roles; public education programs; operations and maintenance considerations; and cost-recovery methodologies.

Finally, at the end of Phase II it was proposed that a workshop be conducted to present the various alternatives to a wider group of Tunisian professionals.

To meet the needs of the GOT request, WASH agreed to provide the consultant services of a senior sanitary engineer to work in Tunisia for Phase I of the

assignment. In Phase II a management specialist and social scientist together with the sanitary engineer, who was to act as the team leader, were to carry out the agreed-upon activities.

1.2 Scope of Work Modification

Soon after the arrival of the WASH consultant in Tunisia, the scope of work was reviewed by the MOPWH and modified so that it concentrated mainly on the formulation of a national strategy for sewage disposal management in areas not served by ONAS.

The MOPWH specifically requested that the assignment be conducted in three phases as follows:

Phase I: Conduct an assessment of sewage disposal in Tunisian urban areas in order to diagnose the issues and problems of this subsector.

Recommend a process to the MOPWH for formulating a national strategy for sewage disposal.

Assist the MOPWH with the development of models (demonstration projects) to address special sanitation problems, specifically the sanitation and hydrological problems posed in the Soukra/Choutrana area of Greater Tunis.

Phase II: Formulate a national strategy and prepare a draft strategy document.

Provide technical assistance in setting up the proposed models.

Phase III: Prepare and conduct a workshop to present the draft strategy document to Tunisian professionals and administrators who would be responsible for making decisions on sewage disposal systems development and operations.

Present the new technologies and preliminary research results to the participants.

1.3 Phase I - Implementation Methodology

Prior to the departure of the consultant a briefing took place at WASH offices in Washington, D.C. The scope of work and appropriate sanitation documents were reviewed, and a work plan was formulated.

In Tunisia, the scope of work was reviewed and finalized with Tunisian Government and USAID officials. Documents related to the sewage disposal subsector were collected and reviewed. Meetings with representatives from relevant institutions in the public and private sectors were conducted at the national and regional levels, including the regions of Greater Tunis, Sfax (Southern Region), Sousse (Central Region), and Nabeul (Cap-Bon Region). Site visits to sewage disposal systems and problem areas in these regions were conducted (see "Schedule of Activities" in Appendix B).

At the conclusion of Phase I separate debriefing sessions were held with ONAS, the MOPWH, and RHUDO to review and discuss the consultant's findings and recommendations, presented in their final form in this report.

Chapter 2

SUMMARY FINDINGS AND RECOMMENDATIONS

A summary of the findings and recommendations concerning sewage disposal management issues in areas not served by ONAS is presented in tabular form as Table 1. It outlines key areas of concern, identifies problems and issues, and proposes solutions and Phase II interventions.

Table 1

SUMMARY OF FINDINGS AND RECOMMENDATIONS
SEWAGE DISPOSAL MANAGEMENT AREAS NOT SERVED BY ONAS

AREA OF CONSIDERATION	SECTOR SITUATION PROFILE	MAJOR PROBLEMS AND ISSUES	PROPOSED OPTION TO ADDRESS PROBLEMS	PHASE 2 - STUDY INTERVENTIONS
1. NATIONAL SEWAGE DISPOSAL POLICY	1.1 The goal set by the GOT is to eliminate potential water and soil pollution and impact on public health by unsanitary sewage disposal.	1.1 This is an acceptable sector policy.	1.1 Keep as is.	1.1 No action.
	1.2 Specific objective is to achieve the same population coverage with piped water supply for sanitary sewage disposal.	1.1 This objective is very ambitious and will require much time, effort, and funds to achieve within the foreseeable future.	1.1 Search for a more realistic objective to be achieved by the end of the present five year development plan (1987-1992).	1.1 Assist the GOT in formulating more realistic objective that is achievable in the next three to five years.
2. COVERAGE STRATEGY	2.1 Achieve municipal sewer connection managed by ONAS for 56% of urban household by 1991.	2.1 This will be difficult to achieve as only 30% (24% ONAS, 6% municipalities managed) of households are served at present. Another 22% of households in Tunisia use autonomous systems.	2.1 Extend coverage through the use of micro-(autonomous) systems to complement ONAS in all municipalities outside municipal perimeters.	2.1 Determine approach which will help achieve greater population coverage.
	2.2 Criteria for selection of ONAS service in order of priority are: - Touristic coastal areas (Grand Tunis, Sousse/Sfax, Cap-Bon, and DJerba) - Major Cities (Tunis, Sousse, Sfax) - Industrial areas - Municipalities in the watershed of the Medjerda River	2.2 Sewer coverage achieved is already quite low along coastal touristic zones. It is even lower in the priority zones. Therefore it is difficult for ONAS to extend services to the rest of the country.	2.2 ONAS service will need to be redefined as it may opt to provide coverage to priority areas by the most appropriate method and not only by conventional methods. Micro-(collective) systems could be part of ONAS systems.	2.2 Determine and propose redefinition for sewage management in Tunisia. Determine adequacy, effectiveness, and appropriateness of priorities.
	2.3 ONAS action to extend services must follow housing, industrial, and tourism development projects.	2.3 This policy has been shown to be problematic and unreachable. Development projects are moving too fast for ONAS.	2.3 Regulations will have to be made clear with regard to sewage disposal for development projects; they will will need to be fully enforced.	2.3 Determine policy regarding service extension to planned and unplanned development projects.

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SEWAGE DISPOSAL MANAGEMENT AREAS NOT SERVED BY ONAS

AREA OF CONSIDERATION	SECTOR SITUATION PROFILE	MAJOR PROBLEMS AND ISSUES	PROPOSED OPTION TO ADDRESS PROBLEMS	PHASE 2 - STUDY INTERVENTIONS
3. APPROPRIATE TECHNOLOGIES	3.1 The technology of choice of the GOT is the conventional sewage system (separated sewer systems, secondary treatment facilities).	1.1 The technology of choice is too expensive as construction costs are high (avg. 50 dinars/ml) and O+M costs are also quite high (0.33 dinars/cubic meter of sewage).	1.1 Promote the development of micro-community or individual systems as much as possible, and use municipal sewers in concentrated and difficult areas.	1.1 Develop criteria for the choice of applicable technologies.
	3.2 Autonomous systems used are pit latrines in dispersed areas, soakage pits in dense areas. Few houses use a septic tank before disposal in cesspools and in soakage pits. Collective systems use either soakage pits, septic tank/soakage pits, septic tank/absorption fields, or surface pondage.	3.2 The technologies used for autonomous systems are appropriate in terms of costs and maintenance requirements. However, in most cases they are poorly designed and constructed.	3.2 Develop specifications and techniques for designing, constructing, and maintaining macro-autonomous systems (individual and collective). Develop geotechnical maps for effluent disposal by dilution or absorption.	3.2 Prepare design specifications for applicable systems in Tunisia. Also prepare construction specifications and operations and maintenance specifications.
4. SECTOR ORGANIZATION A. PUBLIC SECTOR INSTITUTIONS	A.1 Public sewage systems management in urban areas is either the responsibility of ONAS when it is an official ONAS mandated area, or the municipalities when ONAS is absent.	A.1 There exists a misconception of roles and responsibilities among the operators. ONAS is conceived by municipalities and others as being the responsible agency for all sewage disposal matters whether it is officially in a municipality or not.	A.1 Roles and responsibilities must be clearly defined and understood. Municipalities must be brought to understand their own responsibilities with regard to sewage management in areas where ONAS does not serve.	A.1 Examine and define roles and responsibilities of all intervening agencies, and propose institutional strengthening actions as appropriate.
	A.2 Autonomous systems promotion is practiced by the MOPH which serves as advisory agency to local governments.	A.2 The MOPH has primarily been promoting autonomous systems through health education interventions and advice to private and public institutions. At present the MOPH has not promoted a funded sewage disposal management program.	A.2 The MOPH should be encouraged to develop a program to support the development of autonomous systems in urban and rural areas. They have experience, expertise, and resources to reach potential users.	A.2 Determine and propose redefinition for sewage management in Tunisia. Determine adequacy, effectiveness, and appropriateness of priorities.
	A.3 The sewage management regulatory agencies in Tunisia are the Ministry of Equipment and Housing (Direction de l'Hydraulique Urbaine), the Ministry of Health, and the newly created National Environmental Protection Agency (ANPE).	A.3 It is not clear among agencies what institutional roles and responsibilities are with regard to sewage disposal. Institutional capabilities of the Ministry of Equipment and Housing and ANPE are not known.	A.3 Clarify the roles and responsibilities of the regulatory agency, and strengthen their capability to fulfill their roles and responsibilities.	A.3 Determine strengths and weaknesses of regulatory agencies, define roles and responsibilities, and propose plans to strengthen these agencies as appropriate.

SUMMARY OF FINDINGS AND RECOMMENDATIONS
SEWAGE DISPOSAL MANAGEMENT AREAS NOT SERVED BY ONAS

AREA OF CONSIDERATION	SECTOR SITUATION PROFILE	MAJOR PROBLEMS AND ISSUES	PROPOSED OPTION TO ADDRESS PROBLEMS	PHASE 2 - STUDY INTERVENTIONS
4. SECTOR ORGANIZATION (continued)	B.1 There is a large corps of consulting architects and engineers who are involved in housing and construction.	B.1 Most architects and engineers who provide design and management services to housing projects are not familiar with autonomous sewage disposal specifications.	B.1 Consulting architects and engineers will have to be informed on approved technologies for autonomous systems design, construction, and maintenance.	B.1 Determine best approaches for disseminating information to consulting architects and engineers.
	B.2 Fifteen sanitation firms which are registered with the MOPH have been indentified. Most of these firms provide septage removal services.	B.2 Sanitation firms are too few to satisfy present demand for services. Moreover, their equipment is very costly and inappropriate for small operations. Most firms are unfamiliar with maintenance specifications.	B.2 Sanitation firms must be encouraged to develop and expand services beyond Tunis, Sousse, and Sfax. Both small enterprise and large firms must be encouraged to provide maintenance services for autonomous and municipal systems.	B.2 Determine approaches for encouraging existing firms and recruiting others to ensure wide service coverage through Tunisia.
B. PRIVATE SECTOR INSTITUTIONS	B.3 There are a few manufacturers who are interested in producing prefabricated septic tanks.	B.3 Manufacturers are not familiar with construction specifications.	B.3 Manufacturers should be encouraged to fabricate autonomous systems units.	B.3 Assess manufacturers' capability, interest, and needs to fabricate autonomous systems units.
C. LEGISLATION AND ENFORCEMENT	C.1 Several laws and decrees exist on water management, water pollution control, water use, etc.	C.1 Laws and decrees regulating the sector are dispersed among various agencies. Their appropriateness may be questioned.	C.1 All laws and decrees regulating sewage disposal need to be identified and reviewed for appropriateness and amended as necessary.	C.1 Collect and review existing legislation and make recommendations as appropriate.
	C.2 There exist regulatory acts at all levels of government concerning sewage disposal.	C.2 There appears to be no norms and standards for autonomous units design, construction, and operations and maintenance. Whatever regulations do exist are not generally enforced.	C.2 There should be national norms and standards regulating the utilization, design, construction, and operation and maintenance of autonomous sewage disposal units. Monitoring and enforcement programs should be established.	C.2 Propose norms and standards for regulating utilization, design, construction, and O&M of autonomous sewage disposal units. Propose approaches for monitoring and enforcement of sector regulations.

SUMMARY OF FINDINGS AND RECOMMENDATIONS
SEWAGE DISPOSAL MANAGEMENT AREAS NOT SERVED BY ONAS

AREA OF CONSIDERATION	SECTOR SITUATION PROFILE	MAJOR PROBLEMS AND ISSUES	PROPOSED OPTION TO ADDRESS PROBLEMS	PHASE 2 - STUDY INTERVENTIONS
5. OPERATIONS AND MAINTENANCE OF SEWAGE DISPOSAL SYSTEMS	5.1 ONAS operates and maintains its systems. It also provides emergency services to municipalities and autonomous systems.	5.1 ONAS cannot satisfy its own operations and maintenance duties, and therefore will in the future limit its services to municipalities and private systems.	5.1 ONAS itself has been using private sector maintenance services for its sewers: therefore it should not be relied upon as a service provider.	5.1 Review projected development scheme of ONAS and determine its potential need for private sector services.
	5.2 Existing systems are old and require special attention.	5.2 Many municipal systems are either not properly maintened or not maintened at all.	5.2 Municipal systems maintenance should be contracted out to private sector services. However, these must be regulated.	5.2 Assess the municipalities' need for private sector services.
	5.3 Autonomous systems depend on ONAS, municipal, and private sector services for maintenance.	5.3 A major concern of Tunisian authorities is the lack of service for autonomous systems.	5.3 Encourage local development of private sewage disposal systems maintenance firms. Provide financial incentives to private sector.	5.3 Develop approaches to encourage the creation of local private services. Determine possible incentives which may be given to encourage private sector.
6. HUMAN RESOURCES DEVELOPMENT	6.1 ONAS has a staff of 1,869 of which 6.2% are cadres (engineers and other professionals), 23% are operations personnel (technicians), 70% are technicians and skilled workers, and 1% are others.	6.1 Outside of ONAS, very few qualified professionals in sewage disposal systems design, operations, and maintenance exist. The non-ONAS municipalities only have specialized workers to perform all services related to systems management.	6.1 Develop short courses, seminars, workshops, etc., to train all levels of technical personnel (professional, technicians, workers) in autonomous systems design, construction , and/or maintenance as appropriate for public and private sector institutions.	6.1 Determine training needs for all categories of personnel.
	6.2 Specialized training in hydraulics is offered at ENIT.	6.2 ENIT does not at present have courses in autonomous systems design and construction.	6.2 Encourage higher education institutions to develop formal training of autonomous systems as part of curriculum.	6.2 Develop approaches to support institutions strengthening to deliver training programs.
	6.3 Senior technicians in civil engineering are trained in Nabeul.	6.3 There are no training programs available to skilled workers.	6.3 Develop local training programs for skilled workers.	6.3 Develop approaches to train skilled workers locally.

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AREA OF CONSIDERATION	SECTOR SITUATION PROFILE	MAJOR PROBLEMS AND ISSUES	PROPOSED OPTION TO ADDRESS PROBLEMS	PHASE 2 - STUDY INTERVENTIONS
7. COMMUNITY ORGANIZATION AND PARTICIPATION	7.1 ONAS has very few contacts with the public concerning sewage disposal matters.	7.1 A large percentage of the population has been reported not to be motivated in obtaining an adequate sewage disposal system.	7.1 Community motivation, mobilization, education, and participation must be included as a part of all sewage disposal systems development.	7.1 Determine approaches to institutionalize community development and public education programs for sewage disposal systems development.
	7.2 Neither ONAS nor the municipalities has an on-going community organization and education program.	7.2 A large percentage of the public does not understand the risks and risk elimination processes of sewage disposal.	7.2 Education programs need to be developed and implemented by concerned agencies throughout the country in order to change perception and behavior.	7.2 Determine approaches to encourage behavioral changes vis-a-vis autonomous systems acceptance and utilization.
	7.3 Large numbers of communities have been reported to participate in funding construction work to be connected to ONAS systems.	7.3 Communities are not encouraged to take such actions as they have a tendency to wait for ONAS.	7.3 Special programs should be designed to encourage communties to participate in all aspects of development.	7.3 Propose objectives for special community development programs to encourage participation.
	7.4 The population does not respond to collective systems.	7.4 Population does not understand the need for maintenance and is not organized to act.	7.4 Develop local associations or "syndiques" to address collecive systems.	7.4 Determine approaches for community organization to address collective systems.
	7.5 In some communities technologies for autonomous sewage disposal systems are poorly used or not used at all.	7.5 A certain segment of the population does not use certain small disposal technologies.	7.5 Select technologies according to user attitudes and develop education programs.	7.5 Assess attitudes toward different sewage disposal systems and suggest education strategy.

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AREA OF CONSIDERATION	SECTOR SITUATION PROFILE	MAJOR PROBLEMS AND ISSUES	PROPOSED OPTION TO ADDRESS PROBLEMS	PHASE 2 - STUDY INTERVENTIONS
8. APLLIED RESEARCH CASE STUDIES, AND EVALUATION	8.1 Several technologies for autonomous sewage disposal are in use or have been tried in Tunisia. Local technologies are not fully understood.	8.1 The indroduction of modified or new technologies requires adequate knowledge of past experiences. These are not documented and therefore offer no learning possibilities for introducing new ideas.	8.1 A countrywide evaluation of the sucess or failure of autonomous systems is required. Understanding of reasons for local practices is also necesssary.	8.1 Develop approaches for learning from past experience and understanding reasons for technology conception and use at local level.
	8.2 There are several higher education institutions interested in sewage disposal research and educational opportunities for students. Among these are ENIT, the Institute Superieur de Nabeul, and the Ecole National d'Architecture.	8.2 Educational institutions are not at present being used as full partners in national sewage management programs, although they have proven their interest. Thus, an opportunity to learn is lost to the detriment of sewage disposal management.	8.2 Educational institutions should be encouraged and brought into the development process as full partners. They should be given responsibility for designing and implementing applied research case studies and evaluation in this subsector.	8.2 Identify Institutions which could be used for applied research, case studies, and evaluation. Work in partnership with ENIT and other institutions as appropriate in designing three case studies for autonomous sewage disposal systems.
	8.3 Because socioeconomic and developmental conditions throughout the country are different, no technology can be relied upon as appropriate for all parts of the country.	8.3 Technologies applicable in northern Tunisia have met failure in central and Southern Tunisia and vice versa.	8.3 Develop applied research mechanism to introduce new or modified technologies. Models should be tested in the field and problem areas should be identified and resolved.	8.3 Conduct special study with ENIT of the Soukra/Choutrana Region of Tunisia to determine causes for hydraulic/hydrogeological problems, and the impact of autonomus systems on the area.
9. SECTOR FINANCING	9.1 Sewage systems development, operations, and maintenance are financed by user fees (40% recurrent costs), government subsidies (60% recurrent costs plus grants), and funds from local collectives.	9.1 Construction and recurrent costs for municipal sewage systems are very high. GOT investment from 1975-1986 in ONAS alone is 185 million dinars. Systems extension and recalibration in areas already served will make it difficult for ONAS to expand to the other 199 municipalities.	9.1 A realistic financial plan for sewage disposal systems must be developed and priorities determined for future investment. Methods for controlling expenditures will need to be applied.	9.1 Determine approaches for maximizing financial investment in sewage disposal services development and maintenance. Examine financial capability and requirement of municipalities to manage sewage systems.
	9.2 Community self-financing schemes of municipal sewage construction have had precedence in Tunisia.	9.2 There seems to be a reticence to promote community self financing schemes for sewer connections to ONAS systems. Thus, a financing potential may not be explored and utilized.	9.2 ONAS should promote such community schemes, but should also study appropriate approaches for service.	9.2 Determine approaches for community participation in municipal systems development.
	9.2 Autonomous systems construction and maintenance are the full responsibility of owners.	9.2 The costs of construction and maintenace are generally high due to poor design and execution.	9.2 Construction and O&M costs must be brought down to affordable level for targeted users. Good design and construction will reduce cost. Cost must also be regulated in order to maintain availability of sewer.	9.2 Determine approaches to lower and sustain construction and O&M costs for micro-autonomous systems. Determine approaches for effective cost recovery.

Chapter 3

OVERVIEW OF SEWAGE DISPOSAL IN TUNISIA

3.1 General Information

The current population of Tunisia is estimated at 7.7 million, an estimated 56 percent, or slightly more than four million, of whom live in urban areas. Tunisians living in urban areas are congregated in 247 municipalities or communes whose populations vary from less than 1,000 to more than 600,000.

The number of housing units in Tunisia is estimated at 1.49 million with 0.83 million units in urban areas. Almost 1.12 million households are connected to piped water distribution systems of the National Water Supply Company (SONEDE). In urban Tunisia 775,587 housing units are connected to piped water systems. In rural Tunisia, about 36 percent of the estimated .66 million housing units are connected to a piped water distribution system. In addition, 106,813 housing units are connected in areas which are neither urban nor rural (e.g., the area between Dar Chaabese and Nabeul).

According to the 1987 figures, the average drinking water consumption for those connected to piped water distribution systems varies from 33 liters per person per day in southwest Tunisia (Gafsa) to 189 liters per person per day in central eastern Tunisia (Monastir). The national average drinking water consumption was 108 liters per person per day for that same year.

3.2 Sewage Disposal Policy and Program in Tunisia

3.2.1 Objectives

Sewage disposal policy in Tunisia is quite straightforward: to ensure that sanitation coverage is extended to all households and other establishments that have a water supply. Specifically, all households furnished with piped water supply should be connected to sanitary sewers which meet high enough standards so that there is no adverse socioeconomic, health, and/or environmental effects. The National Sanitation Commission (CNA) is responsible for seeing that that goal is carried out. The CNA, which reports to the Prime Minister's office, is responsible for advising the government on national sanitation policy. It is made up of representatives from the relevant ministries. Another important objective of the CNA is to complement the country's meager water resources by promoting the reutilization of treated wastewater for industry and agriculture. The strategic approach taken by the GOT to achieve the above objectives is described in the following sections.

3.2.2 Service Coverage

In urban areas at least 81 percent of the population should be connected to the municipal sewage disposal system by 1990. The remaining non-covered population

is encouraged to rely on alternative sewage disposal methods. Priority areas for sewage disposal systems development in Tunisia are as follows:

- touristic or coastal areas, including the major cities of Tunis, Sousse, and Sfax;
- industrial areas, and
- the municipalities along the River Medjerda, the principal drinking water source for the majority of Tunisians.

The approach followed nationally is to

- build sewage disposal systems where there are development projects in the areas of public and private housing, industry, and tourism;
- recalibrate or renovate sewage disposal systems which are under ONAS management in its areas (municipalities and touristic areas); and
- increase service levels in ONAS designated areas.

Fifty-two percent of the Tunisian households have access to waterborne sewage disposal systems. Of this, 30 percent is covered by municipal systems and 22 percent by individual systems (septic tanks and/or cesspools); the remaining 48 percent of households have no system. Of the 30 percent covered by municipal sewerage, ONAS coverage represents about 79 percent and the remaining 21 percent is covered by municipal systems.

In urban areas, over 51 percent of households are connected to a municipal system compared to about 3 percent in rural areas. In addition there are individual or autonomous systems. About 29 percent of urban but only 14 percent of rural households are served by such systems. The remaining 20 percent of urban housing units and 83 percent of rural units have no sewage disposal systems.

Of the volume of sewage disposed through ONAS systems, 83 percent receives treatment. Municipal-managed sewage systems generally receive no treatment before disposal.

3.2.3 Choice of Technology

The sewage disposal technology of choice is collection through municipal sewers and treatment by conventional treatment plants. Sewerage systems are made up of appropriate sewage pipes, which are fabricated in Tunisia (concrete/ reinforced concrete, PVC, and asbestos), pumping stations, conventional

treatment plants (aerated sludge, trickling filters, aerated lagoons, stabilization ponds), and other sewer appurtenances such as concrete manholes and cast iron manhole covers.

The autonomous sewage disposal technologies in use in Tunisia are pit latrines, soakage pits, cesspools, septic tanks, and percolation fields. Latrines are generally used in areas outside of municipal limits where the population density is low. The technology used most often in densely populated areas (peri-urban and urban areas) is cesspools, which receive raw sewage directly from houses. Some houses in urban and peri-urban areas use soakage pits, a combination of septic tank/cesspool or soakage pit, or septic tank/percolation fields. In some areas, there are no sewage disposal systems. In the newer housing development projects, which are not served by municipal sewers, collective systems are used, generally a collective septic tank and either cesspools or soakage pits or a percolation field.

3.2.4 Sector Organization

Public Sector Institutions

By decree ONAS is the official public authority responsible for sewage disposal in all communities with populations greater than 2,000. ONAS assumes specific responsibility for

- conducting feasibility studies for sewage disposal;
- identifying projects and implementing studies;
- planning, designing, and implementing sanitation projects; and
- managing, operating, constructing, renovating, and maintaining all sewage systems components (sewers and treatment facilities) inside municipal perimeters and in the touristic and industrial development zones.

In municipal areas not covered by ONAS, the municipality--generally through a service designated for sanitation--is responsible for sewage disposal for municipal and individual systems.

In 1987 ONAS became officially responsible for sewage disposal operations and maintenance services in 48 municipalities (a little less than 20 percent of all municipalities). Thus, 2.62 million inhabitants lived in the areas covered by ONAS (about 60 percent of the total urban population). About 1.82 million (78 percent) inhabitants living in the ONAS areas were connected to systems managed by ONAS. It should be noted that about 76 percent of households connected to the municipal water distribution systems in the ONAS areas were also connected to the sewage disposal systems managed by ONAS. In 1987 there were 318,362

connections reported on ONAS sewage systems. The ONAS systems comprised 3,687 kilometers of sewers with 157 pumping stations and 26 treatment plants.

Municipal sewage disposal systems not yet under ONAS management are directly managed by the individual municipality sanitation or technical services. These municipalities also provide maintenance services (emptying and disposal of sludge) for privately owned sewage disposal systems in residential, touristic, and industrial areas that are not served by ONAS. Municipalities provide this service primarily to areas within their jurisdiction but not served by private sewage disposal companies.

In non-communal areas the governorate councils and the technical services at the delegation level ensure sewage disposal management, operations, and maintenance for collective and, in some instances, for individual systems. There seems to be several public sewerage systems serving communities outside municipal perimeters, particularly in the Cap-Bon region. These systems are estimated to serve about 109,000 inhabitants.

The Bureau of Public Hygiene and Environmental Control (Direction de l'Hygiène du Milieu et de la Protection de l'Environnement) of the Ministry of Public Health has responsibility for monitoring and controlling the hygienic conditions of sewage disposal. It should be noted that the ministry accomplishes this function through municipal hygiene and regional public health services. It also intervenes in the promotion and construction of individual and collective sewage and excreta disposal primarily in rural Tunisia.

The Bureau of Urban Hydraulics (Direction de l'Hydraulique Urbaine) of the MOEH is the regulatory agency for sanitation systems development in urban areas. ONAS is officially under the aegis of this bureau, which reviews and approves its projects and activities.

The National Agency for Environmental Protection (ANPE) was officially created in August 1988 (see Appendix C). Among its other prerogatives, this new agency is responsible for regulating and controlling the disposal of all underground wastes (domestic, commercial, or industrial).

Municipalities are technically under the aegis of the Ministry of the Interior. Several departments of this ministry regulate their administrative and technical services. The large municipalities of Tunisia generally have developed technical and engineering services, while the smaller ones do not possess such resources. However, the larger municipalities were the first to be placed under the charge of ONAS.

Private Sector Institutions

Seven private companies are reported to provide sewage disposal systems maintenance services in Tunisia. These are located primarily in Tunis, Sousse, and Sfax. In addition a large number of small entrepreneurs provide sewage disposal systems maintenance services to individual systems located in residential and industrial areas.

At present about 16 sanitation companies are licensed by the Ministry of Public Health (see Appendix D). However, nine of the 16 companies provide mostly cleaning (industrial and commercial), disinfection, and disinsectization services. Generally the companies that provide sewage disposal services are relatively small. The equipment they use ranges from one tank truck with pumping capability to several trucks per company. Their services (other than septage removal) include removal of water from flooded caves, transport and disposal of industrial wastes, and hauling water for construction purposes. Tank sizes vary from 5 to 10 cubic meters. Many companies purchase the truck and have it locally converted to a tank truck, as cisterns are manufactured in the country.

Besides these 16 licensed companies, several small entrepreneurs convert their trucks temporarily by renting a cistern and pump and mounting them on their trucks in order to perform specific jobs. These services are available only intermittently, for a small operator will not rent equipment unless there is a large request.

As for the design and construction of autonomous sewage disposal systems units, Tunisian manufacturers of prefabricated units, such as PVC septic tanks, have expressed an interest in satisfying the market if there should be a demand. Tunisia also possesses a number of consulting architectural and engineering firms which can be tapped to serve clients in the design, management, and construction of autonomous systems.

Legislation, Norms and Standards

The water supply and sanitation sector in Tunisia is well legislated under Law No. 75-16 of March 31, 1975, "Water Code." Water management, water wastage (gaspillage), water quality, water pollution, and sanitation is also well legislated. Larger municipalities, such as Tunis, Sousse, and Sfax, have municipal regulations on public hygiene that cover general sewage disposal. However, no norms and standards are found for the design and construction of individual sewage disposal systems. A list of laws and decrees which legislate water in general is presented in Appendix E.

3.2.5 Manpower Development

ONAS has a staff of 1,869 consisting of 115 management and engineering staff; 427 operations staff; 1,316 technicians and skilled workers; and 11 other personnel. The staffs of most municipal and regional sewage disposal services consist of skilled workers.

Professional and technical personnel are trained in engineering and technical schools in Tunisia and abroad. ONAS operates a manpower development program which provides on-the-job training and short-term seminars, conferences, workshops, and courses.

The Ministry of Public Health through the Faculty of Medicine of Tunis and the Public Health School of Nabeul has an official training program for senior

technicians and public health cadres who receive training in design, construction, and control of autonomous sewage disposal systems.

There are no known training programs (formal of informal) for mid-level technicians and skilled workers on autonomous sewage disposal systems in Tunisia.

3.2.6 Community Organization and Participation

The level of organization and participation of the population with regard to sewage disposal varies with the socioeconomic status of individuals. While everyone accepts and understands the importance of ONAS systems, not everyone is sensitized to individual roles and responsibilities in those areas where ONAS is not present. And while the importance of sewage disposal is widely accepted, the environmental or hygienic impact of poorly constructed individual systems is not understood by a large portion of homeowners. Moreover, the population seems to rely on government services to address their individual needs.

Some form of community organization exists particularly in housing projects or apartment buildings. In some cases, a building superintendent or property manager is hired to manage the project or building. This person has responsibility for the sewage disposal system of the project or building if it is an individual system.

There seems to be a willingness among some homeowners to finance appropriate individual or collective sewage disposal systems. Many cases have been cited of communities paying all construction costs to build miles of transmission lines connecting them to the ONAS system. ONAS itself cites cases of individuals requesting information on state-of-the-art design and construction of individual systems. There are, nonetheless, many cases where people are not interested in paying for the construction or maintenance of individual systems.

3.2.7 Sewage Disposal Systems Financing

Capital Costs

Funds for ONAS sewage disposal systems construction and equipment are obtained through government subvention, utilization of reserves, and loans from foreign institutions such as the World Bank, USAID, the Islamic Development Bank, Sweden's AID, Germany's KFW, and the Saudi Development Fund. Between 1974 and 1986, 184.9 million TDs (Tunisian Dinars) have been invested in ONAS sewage disposal systems development and improvement.

The construction of non-ONAS public sewage disposal systems is funded by municipalities or by governorate council projects. At present the average cost for constructing one linear meter of sewers is 40 to 50 TDs (1 TD = U.S. $.89). The household connection cost to ONAS systems averages 200-250 TDs.

Private construction of sewage disposal systems is funded directly by owners. The cost for constructing an individual system at present ranges from 200 TDs to over 1,000 TDs.

The cost of purchasing a fully-equipped truck to haul septage varies between 40,000 to 80,000 TDs. The cost of renting and mounting a locally manufactured cistern and pump for truck conversion varies from 30,000 to 50,000 TDs.

Operations and Maintenance Costs

ONAS operations and maintenance funds are obtained from revenues collected from users (based on the volume of piped water consumed from SONEDE), connection fees, municipal tax receipts collected by the Fonds Communs des Collectivités Locales, direct subsidy or compensatory contribution by the GOT, and the sale of by-products and services.

In 1987, the operation and maintenance cost for ONAS was reported at 0.181 TD per cubic meter of sewage disposed through ONAS systems. The recurrent cost (including amortization) was 0.258 TD per cubic meter. This should be compared to the average receipt of 0.1083 TD per cubic meter from user fees and sales of services and by-products.

Non-ONAS municipal operations and maintenance funds are obtained from municipal tax revenues and the sale of service. In non-municipal areas, sewage disposal operations and maintenance is paid for with revenue collected by the Fonds Communs des Collectivités Locales and the sale of services.

The cost of operating and maintaining individual sewage disposal systems is directly paid by owners. The following examples show what some autonomous sewage disposal maintenance (septage collection and disposal) services charge:

- Licensed companies: 3 to 4 TD per cubic meter per trip.
- Public services: 2 to 2.5 TD per cubic meter per trip.
- Unlicensed local entrepreneurs: 1.5 to 2 TD per cubic meter per trip.

Chapter 4

PROBLEMS AND ISSUES

4.1 Service Coverage

The sewage disposal coverage strategy stipulated by the GOT (i.e. 81 percent coverage of the population by 1990) was found to be overly ambitious and not feasible within the timeframe that was proposed. With about 30 percent of the total households of Tunisia connected to municipal sewer systems, it is evident that much remains to be done in order to guarantee adequate sewage disposal coverage not only to those who rely on autonomous sewage disposal methods, but also to the 48 percent who do not have access to any sewage disposal systems.

In urban Tunisia indications are that 49 percent of the population is not served by ONAS. Moreover, ONAS continues to lag behind SONEDE in providing sewage connections to all households connected to the SONEDE distribution system.

The demand for sewer connections will continue to increase significantly because of the expansion of urbanization and modern housing developments and also because of the increased demand for public sanitation that requires adequate sewage disposal services.

To meet the anticipated demand for sewer connections, the GOT will be required to make substantial investments in both sewage systems development and operations and maintenance.

As the system expands, the volume of sewage which must be transmitted through the ONAS network to treatment facilities and/or disposal outfalls will increase. For this reason, and because of normal population growth and increased water consumption, Tunisia's community sewage disposal systems will undoubtedly require recalibration and/or extension. To expand and recalibrate/renovate the ONAS systems, the GOT will need to invest greater physical and financial efforts to guarantee adequate operations, maintenance, and management of sewage systems.

4.2 Technology

The GOT has opted for conventional sewage systems technology, i.e., municipal sewer networks, treatment plants, and effluent disposal in surface water bodies. This approach has its rightful place in the densely populated urban communities, but it is too expensive to be adopted as the urban technology of choice.

Although the GOT recommends that alternative sewage disposal methods be used by consumers not connected to community sewage systems, no specific technology is mandated or promoted for houses connected to piped water distribution systems (SONEDE). The current practice is for individuals to design and construct their own systems. There are no norms or standards for individual sewage disposal systems design and construction. Some homeowners contract with architects to

design and manage construction of their systems. However, these systems are rarely inspected either by the architect or by the municipal authority.

For individual consumers, the most widely used technology is disposal in cesspools or soakage pits dug to the water table level in order to insure proper disposal of water. These technologies are used regardless of soil suitability, the water table level, or the potential impact on public hygiene or environment.

Most cesspools, soakage pits, and septic tanks are designed and constructed by local skilled workers (masons) and sometimes by workers who have no knowledge of such systems. These are generally poorly designed and constructed. They are often cheap to construct (200 to 1,000+ TDs) but expensive to operate and maintain (2 to 3 TDs per cubic meter per trip within municipal perimeters). According to reports, the average septage disposal service cycle is 6 and 24 months; however, some systems have a weekly emptying cycle. The high cost of maintaining these local technologies has made them prohibitive for a large percentage of the population.

In Tunisia raw sewage is commonly disposed of in open fields, dried wadis, or nearby water bodies, creating unacceptable environmental and public health conditions. The exceptions are with ONAS systems, which adequately treat most of the effluent prior to its final disposal. Municipalities that are not designated as ONAS service areas generally do not provide any form of treatment to sewage before the final disposal of the effluent.

4.3 Sector Organization

4.3.1 Public Sector Institutions

In Tunisia it is unclear which government institution is responsible for sewage disposal management. Because the conventional method is the technology of choice for sewage disposal in urban or municipal areas, ONAS is generally perceived as the responsible authority for sewage management. It is called upon to address all technical projects and problems outside its service area.

ONAS is held responsible for ensuring that its sewers are extended to all neighborhoods within municipalities that it has taken over. This situation has not encouraged the development of alternative systems of sewage disposal. Even when non-served residential communities develop an alternative to ONAS, it is often conceived as a temporary system which will be connected to ONAS in the future. However, the effluent of these systems is generally given little treatment, and the operations and maintenance system is undefined.

In municipalities where ONAS is responsible for managing the sewage systems, municipal services for sewage disposal have been dismantled and now play no role in sewage management. In municipalities where systems are not yet managed by ONAS, technical services are weak. The general attitude is not to do anything but simply to wait for ONAS to come in and manage the system. These municipalities tend to react to sewage disposal problems in emergency situations by calling upon ONAS to resolve the problem.

There is no authority responsible for regulating the design, construction, and maintenance of autonomous systems in those areas not served by municipal sewage systems.

The Bureau of Hygiene and Environmental Control of the Ministry of Public Health is charged with promoting autonomous sewage disposal systems and regulating sewage disposal in general; however, it is primarily active in rural areas where about 83 percent of the population has no system.

The Bureau of Urban Hydraulics of the Ministry of Public Works and Housing and the National Agency for Environmental Protection (ANPE) have clear jurisdiction over the control of all sewage disposal systems, but their specific roles and responsibilities are not clearly defined. Both agencies appear not to have yet developed the essential capability to perform their respective functions.

4.3.2 Private Sector Institutions

The private sector has a very limited capability to provide construction and maintenance services to sewage disposal systems. Because of the absence of design and construction norms and standards it is difficult to develop a service demand for the private sector. As a result, the private sector in Tunisia is more reactive than active in this subsector.

Should a demand for operations and maintenance services be created, the few private maintenance firms that exist could not satisfy the sewage disposal systems market for both municipal and private systems. Most of the firms contacted found the operations and maintenance business unprofitable and, therefore, were contemplating abandoning it. There would seem to be a good market for these services. Only a handful of operations and maintenance firms exist, while 22 percent of households are served by autonomous systems. However, the necessary equipment must be imported and is subject to customs duties, and the rate of interest on an investment on such equipment is high--prohibitive for new investors and discouraging for expanding existing operations.

4.3.3 Norms and Standards

As stated earlier, there are no norms and standards for design and construction of individual sewage disposal systems. There are no geotechnical or soil maps specifically drawn to provide sewage disposal guidance to the design of sewage disposal systems in areas which are most likely to rely on individual disposal systems. Other technical methods, such as standard soil percolation testing, are not available to assist urban planners in recommending appropriate types of systems for different zones or for identifying zones appropriate for housing development. The few laws in existence on final disposal of sewage are rarely applied. All sewage disposal systems managers, including those at ONAS, are known to employ inappropriate final sewage disposal methods. With these circumstances it is extremely difficult to regulate sewage disposal.

4.4 Operations and Maintenance

During the past 14 years, ONAS has developed appropriate operations and maintenance systems. It is recognized that ONAS will have to give priority in that area to existing sewage disposal systems in order to sustain the status achieved thus far. ONAS is already working beyond capacity in operations and maintenance. Currently, it utilizes the private sector to support its essential operations and maintenance activities. Therefore, it is impossible to request that ONAS support operations and maintenance outside the areas at present covered by its systems.

The services responsible for the management of municipal sewage systems generally do not have the needed institutional capabilities. There is a paucity of trained manpower with enough technical sophistication to manage sewage systems. This is particularly true for the smaller municipalities, which do not have any technical staff other than skilled workers who are called upon to do everything and have no training in the operations and maintenance of sewage disposal systems. It is very difficult simply to continue to leave the responsibility for operations and maintenance to the municipalities.

Private sector institutions were found to be interested in continuing and expanding their capabilities to work in operations and maintenance, provided there is a demand for their service and that they are encouraged to invest in the sector through governmental incentives such as limited taxes on revenue, reduction in custom duties for essential equipment, and lower interest rates to purchase equipment and products which are manufactured outside of Tunisia.

Another constraint in the private sector is the absence of sewage disposal systems maintenance firms outside the three major cities of Tunis, Sousse, and Sfax. The existing firms have a lot of work, primarily in industry and tourism. However, they are often not interested in servicing residential areas, particularly those that are located outside municipal perimeters. At present less than 10 percent of the 247 municipalities are serviced by a private company.

Unless the private sector is able to increase its capacity to provide essential maintenance services to all residential areas that have no option other than to rely on autonomous sewage disposal systems, there will be serious problems in promoting autonomous systems as a complementary option to ONAS. While the tendency will be to attract entrepreneurs from the major cities in Tunisia, serious consideration will need to be given to the development of private sector services in all urban settings.

4.5 Community Organization and Participation

Neither ONAS nor the municipalities has an ongoing community support or education program. Neither has a public education specialist on staff or calls upon outside consultants to mobilize and motivate the population. Officials from both agencies respond to population pressures without establishing community support programs. Such programs would create an effective partnership

between the government entities and the population and educate and sensitize the population so that it would want to participate in sanitation programs.

Community development and education programs in sewage disposal are not institutionalized, although there are regional health education programs. However, there is no coordination or cooperation with municipal and ONAS sewage disposal interventions.

Sewage disposal has a low priority among the essential lifeline services provided to populations because there is a general lack of understanding how sewage disposal can affect public health and the environment.

4.6 Financing

It takes about 50 TDs per linear meter to construct and 0.258 TDs per cubic meter of sewage disposed to operate and maintain a sewage disposal system. Such high costs mean that ONAS will not be able to extend these systems as rapidly as it has done in the past. Operational costs are far higher than service revenue. It is proposed that the present policy of ONAS is not cost effective. ONAS will have to take drastic actions, such as changing its development and operational strategies, in order to arrive at a self-supporting operation.

At present, municipal sewage management costs are low because few resources are invested into systems development and operations and maintenance. Because ONAS is limited in its ability to expand, those municipalities not serviced by ONAS need to manage their own systems. If they are to do so effectively, they will require large investments for strengthening their capabilities, both technically and financially.

Autonomous sewage disposal systems are expensive, given that most systems are simple--and generally inappropriately constructed--cesspools or soakage pits. They are also reported to be extremely costly to operate and maintain. While the 2 to 3 TDs fee per cubic meter for emptying seems to be appropriate, it is reported that more money is spent on septage removal because of the relatively short removal cycles experienced in the denser populated areas and where the water table is reported to be high.

Problems have been reported with the collection of operations and maintenance fees for community sewage disposal systems where no municipal sewers exist. Problems include refusal to contribute by some tenants, the lack of effective collection systems, the lack of tenant organization, and displeasure with maintenance.

4.7 Other Problems and Issues

Other problems and issues which must be taken into consideration are human resource development and applied research/case studies/evaluation.

4.7.1 Human Resource Development

In Tunisia there are very few training programs offering appropriate courses in sewage disposal for professionals and technicians. The Department of Hydraulics of the Tunisian Engineering School once had special training in this subsector; however, at present the school's curriculum in civil engineering does not contain courses on autonomous sewage disposal methods. This is also true for technicians in civil engineering who have received their training at the Institut Technique de Nabeul. Consulting Tunisian engineers and architects appear to have limited training in this subsector. To develop a local professional capability in this subsector appropriate courses in training curricula must be introduced.

Another problem is that skilled workers who are at present responsible for designing and constructing autonomous sewage disposal systems in Tunisia lack appropriate skills and knowledge. No training program is known to exist for masons and others involved in sewage systems construction and maintenance.

4.7.2 Applied Research, Case Studies, and Evaluation

Although some individuals and some housing developers--particularly Agence pour la réhabilitation et la rénovation urbaines (ARRU), Société Nationale Immoblière Tunisienne (SNIT), and private developers--have introduced new technologies in sewage disposal, no research has been conducted to assess the appropriateness, adaptability, acceptability, and affordability of these systems. Moreover, the systems constructed have not been evaluated in order to identify problem areas and constraints. Applied research programs, case studies, and evaluations are essential to the introduction and sustainability of new technologies.

Although institutions of higher education have expressed interest in conducting applied research in the development and/or adaptation of new technologies in the subsector, there seems to be a lack of interest by both the public and private sectors in supporting the role of these institutions. Such support would allow Tunisia to address technical problems with technologies such as autonomous sewage disposal systems.

Chapter 5

POTENTIAL SOLUTIONS FOR ADDRESSING MAJOR PROBLEMS AND ISSUES

The GOT sewage disposal policy is very appropriate. It seeks to ensure proper disposal in order to eliminate all risks to the socioeconomic advances of the country, the health of the population, and the quality of life. The government has recognized the need for a clear strategy to achieve their goal and to address effectively the various problems and issues facing the sewage disposal subsector. The current GOT objective--to achieve the same coverage for sewage disposal as for water supply --has proven to be too ambitious and not achievable in the near future. Therefore, realistic objectives need to be formulated in the course of developing a national strategy for the subsector.

A preliminary analysis of the major problems and issues in the subsector indicates that the potential solutions discussed in this chapter will be part of the national strategy for sewage disposal.

5.1 Service Coverage

Greater sewage disposal coverage for densely populated areas in urban and peri-urban Tunisia is essential to reduce the risk of disaster to the economy, health, and quality of life of Tunisians. This could be achieved by extending and promoting appropriate sewage disposal systems to reach those living in densely populated areas.

In order to achieve maximum coverage, all systems (ONAS, municipalities, and private) must be integrated. However, micro-systems should be given preference, since these are more manageable than macro-systems.

5.2 Technology

Like most countries, Tunisia will need to rely on a mix of applicable technologies in developing the country's sewage disposal capability. A number of technologies which are deemed appropriate for the country are already being used. However, guidelines are needed for determining what technology should be used where, and design, construction, and maintenance standards should be set.

Among the technologies which seemed to be appropriate for Tunisia are conventional sewage systems in densely populated areas and autonomous systems in less dense areas. Systems should be considered appropriate if they can be locally built, if they can be sustained exclusively by the operators/users, and if they can meet the minimum acceptable national norms and standards. Thus, systems employing physical (gravity) means of transport, treatment, and disposal shall be preferred, if their effluents do not pose contamination or pollution risks. In this respect, micro-autonomous systems should be promoted as the technology of choice for a large percentage of Tunisian households.

The promotion of micro autonomous systems will require that design, construction, and maintenance specifications be developed and made official. Geotechnical maps should be developed to provide guidance on the type of sewage disposal systems which are most appropriate in specific urban and peri-urban areas.

5.3 Sector Organization

5.3.1 Public Sector Institutions

Several public sector institutions play essential roles and assume specific responsibilities in the management of the subsector. ONAS, as the most qualified authority in sewage disposal in Tunisia, undoubtedly must continue to play the role of principal operator in the subsector. However, ONAS itself will be unable to meet the service needs of all municipalities in the foreseeable future; therefore, the technical and management capabilities of the municipalities in sewage disposal must be strengthened so that they can play a co-operator role with ONAS. However, for these municipalities, micro systems should take precedence over macro-systems development in order to render sewage disposal manageable. Coordination and cooperation among ONAS and the municipalities will be crucial for ensuring the effective and efficient management of the subsector.

The Ministry of Public Health (MOPH) has an important role to play in sewage disposal regulation. As the promotor agency for individual systems in rural areas, the ministry holds an operator role in non-municipal areas. Therefore, it must be supported and strengthened to become an active partner in the promotion and control of autonomous sewage disposal management in Tunisia. Again, coordination and cooperation between municipal and non-municipal sewage disposal programs will be essential, particularly now as SONEDE is providing house connections to communities of 500 and fewer, which will increase the chance of sewage pollution in these areas.

Finally, the roles and responsibilities of ANPE, MOPH, and the MOPWH as regulatory agencies will need to be clearly specified and developed. These agencies will need to be strengthened in order to fulfil their respective responsibilities.

5.3.2 Private Sector Operators

The role and responsibilities of private sector operators are a crucial element of sewage disposal management in Tunisia. The trend is toward the increased use by ONAS of private companies to perform operations and maintenance work. The private sector should be tapped to provide appropriate services now being implemented by public sector agencies. In many cases, private companies have been found to be more efficient and less expensive in performing specific work, such as sewer cleaning and maintenance, than public sector agencies. ONAS has the capability to service its systems; however, because of its limited resources, it may be more appropriate for ONAS to play a technical and

managerial role and to utilize the private sector to perform the more routine work on its systems.

Municipalities not managed by ONAS should try as much as possible to use private contractors to handle all development and operations and maintenance work in their sewage disposal systems.

Private system owners should be encouraged to use the services of the private sector for design, construction, and maintenance of their systems. However, first the availability of local contractors must be assured in local communities and the quality of the private sector must be regulated. Several public sector agencies also felt that pricing regulations should be introduced.

To develop private industry in the subsector the GOT must encourage entrepreneurs to invest in the subsector. Tax and duty reductions, enforcement of regulations, investment privileges, and work contracting will provide the necessary impetus for private sector participation in sewage disposal management at the community level. The private sector must be developed in all localities of Tunisia where the demand for sewage disposal service exists. Thus, large and small entrepreneurial services will need to be encouraged.

5.3.3 Legislation and Enforcement

Sewage management goals and objectives cannot be achieved in the absence of enforceable laws regulating the subsector. However, before such laws can be formulated, applicable norms and standards for design, construction, operations and maintenance, and effluent disposal must be developed and carefully monitored and controlled by regulatory agencies. A number of laws regulating the subsector are in existence. However, they need to be reviewed and amended to ensure that they are useful.

5.4 Human Resource Development

The development of the subsector will require important investments in human resource development. Short courses, seminars, conferences, and workshops are necessary to train both public and private sector professionals and technicians. Short courses should also be conducted at local levels to improve the knowledge and skills of masons and other skilled workers. One effective way to ensure the quality of workmanship may be to institute the licensing of those working in the subsector in various capacities.

Educational institutions, such as the Tunisian Engineering School, the National School of Architecture, and the technical and vocational schools, should be encouraged to assume responsibility for human resource development.

5.5 Community Organization and Participation

The success of sewage disposal programs depends on the ability of operators to organize communities effectively. Perceptions about who is responsible for

sewage disposal need to change in urban areas. Communities need to be mobilized and motivated to support development as well as operations and maintenance. A public education campaign needs to be conducted.

In areas where collective sewage disposal systems are autonomous, members of the "collective" (collection of houses) must be organized in such a way that they take ownership for the systems and develop the proper mechanism for ensuring systems repair and maintenance. Local associations or management firms must be explored as potential organizational mechanisms to manage collective systems.

5.6 Applied Research, Case Studies, and Evaluation

The promotion of applied research programs, case studies, and evaluation of sewage systems is essential to the promotion of the subsector. A countrywide evaluation of sewage disposal systems should be undertaken in order to identify problem areas and constraints. Such an evaluation could best be conducted by a group of Tunisian experts from both public and private educational and professional institutions.

The responsibility for conducting case studies and applied research, particularly on autonomous sewage disposal systems, should be entrusted to the educational and research institutions in Tunisia. Research and case studies should be used to determine the appropriateness (technical, social, and economic) and adaptability of new or modified sewage disposal technologies in Tunisia.

Like the private sector, the educational and research institutions should be encouraged to become full partners in the development of the subsector. They should be given the technical and financial opportunity to carry out work that not only supports private and public sector operations but also provides them with greater ability to develop student skills and knowledge in sewage disposal systems development.

5.7 Sector Financing

Subsidy of sewage disposal service needs to be closely controlled. While development work will continue to need GOT support, recurrent costs for operations and maintenance must be met through revenue generated from taxes and service fees. Development costs could be lowered by encouraging the construction of micro-systems whether they are operated directly by ONAS or autonomously.

Construction and maintenance costs for autonomous systems need to be lowered to make these affordable and acceptable to the population. Moreover, cost recovery methods for the maintenance of collective systems need to be worked out.

Chapter 6

PROPOSAL FOR FORMULATING THE NATIONAL SEWAGE DISPOSAL STRATEGY

In order to formulate a national sewage disposal strategy, it is essential that an effective and efficient process be established. The process of developing an effective strategy requires political commitment and wide approval by all concerned subsector institutions prior to government adoption. The strategy must also be developed by the Tunisians and not by outside experts.

6.1 Strategy Mandate

The first step is for the MOPWH to sanction the formulation of a strategy by preparing an official mandate. The mandate must clearly specify the scope of work, the team responsible for performing the work, their specific roles and responsibilities, and the approach and methodology to be followed. The mandate must be distributed to all agencies concerned with the outcome of the work in order to ensure their full collaboration in the process.

6.2 Working Group Nomination

Once the mandate has been prepared and made official, the MOPWH will need officially to nominate a strategy team who will be responsible for formulating the strategy document. The team should be composed of at least five professionals, among whom the following expertise can be found:

- urban development planning and management,
- urban hydraulic/sanitary engineering,
- urban development sociology/community and human resource development,
- development economics and financing, and
- public organization development and administration.

The selected team members should be senior professionals from appropriate institutions with ample experience and complete familiarity with the administrative structure and procedures of Tunisia. The team should be nominated for the period required to prepare and present the final national strategy document for adoption by the GOT. This means that the working group should be mobilized on a full-time basis for the periods during which the work is to be performed. For example, the team should work on a full-time basis during the three-week period that is proposed to prepare the draft strategy document.

6.3 Strategy Formulation (Phase 2A)

According to the approach proposed, the national strategy will be formulated by the official Tunisian working team, joined by a technical assistance team from WASH. The strategy should include the following components:

- coverage.
- applied technologies,
- operations and maintenance,
- sector organization (public and private sectors),
- legislation and enforcement,
- human resource development,
- urban sociology and community organization,
- applied research, case studies, and evaluation, and
- sector financing.

The steps that should be followed in formulating the strategy are explained in the following subsections.

6.3.1 Work Plan Development

The first step will be to develop a work plan for the working group. This work plan will detail the activities necessary to perform all tasks and the schedule that should be followed.

6.3.2 Subsector Assessments

The primary activity of the work plan will be to perform in-depth assessments of the subsector in specific sections of Tunisia. These will provide representative profiles. The assessments, which will take into consideration each of the components of the strategy listed above, should result in the development of accurate profiles for each component of the strategy. It is estimated that the assessments will require between seven and ten days to complete.

6.3.3 Analysis of Profiles; Identification of Problems and Issues

Soon after the component profiles have been drawn, the working team will analyze the information and identify the major problems and issues that the strategy will have to address. It is estimated that this activity will require one to two days.

6.3.4 Strategy Formulation

Once the problems and issues have been identified, potential solutions will be sought and proposed. Based on the proposed solutions, subsector goals, objectives, criteria, approaches, and methodologies will be formulated in order to form the national subsector strategy. A draft strategy document will be prepared and discussed with the MOPWH. It is estimated that the preparation of the draft strategy document will require seven to eight days.

6.3.5 Content of the National Strategy Document

The national strategy document should contain the following:

- GOT subsector overall policy and priorities,
- national subsector strategy,
- coverage policy,
- technology application and sustainability policy,
- subsector organization policy,
- public sector institutions intervention policy,
- private sector intervention policy,
- legislation and enforcement policy,
- human resource development policy,
- community organization and participation policy,
- research and development policy, and
- financing policy.

6.4 Special Case Studies or Demonstration Projects (Phase 2B)

While the strategies are being formulated, three case studies will be performed. These case studies should begin the process of implementing the national sewage disposal strategy for areas not covered by ONAS. For this reason, the urban cases chosen represent three different situations: (1) a new urban development area where a choice must be made between different options, (2) a new housing development area where the only possible solution is an autonomous collective system, and (3) a small municipality which must become self-reliant in addressing its sewage management responsibilities. Specifically the cases are as follows:

1) A hydrological and sewage disposal feasibility study for the Soukra/Choutrana area of Greater Tunis. This area comprises 1,800 hectares. Its population is 42,000, with about 8,600 houses. The water level has increased as the area has turned from an agricultural to an urban area. At present, the water table remains high. The rains inundate the lower part of the area, thus rendering sewage and storm water disposal very difficult. Studies of the hydrological situation and soil suitability for underground sewage disposal would provide potential solutions as to the improvement of the hydrology and sanitation situation of the area. It is proposed that this study be done by the Hydraulics Department of the Tunisian Engineering School, the Bureau of Urban Hydraulics of the MOPWH, and the District of Tunis, which has responsibility for the urbanization of the area. MOPWH is to identify a local hydrogeologist as a member of the team who would be responsible for assisting the ministry with national sewage disposal strategy development.

2) A sewage disposal system for a RHUDO-financed housing development project in the municipality of Bou Ficha. This project calls for the construction of 126 units on 26,500 square meters. The site is approximately 2 kilometers from the center of Bou Ficha, which no longer uses its sanitary sewer network. While the developer is proposing to construct two septic tanks, it has no solution for the final disposal of the effluent. It is proposed that this study be conducted by an educational institution and the Bureau of Land Use (Direction de l'Aménagement du Territoire) of the MOPWH. The WASH team will assist with the design of the demonstration project.

3) An effluent disposal system for the municipality of Bou Argoub which has a population of 20,000. The municipality has a critical problem with the final disposal of its raw sewage. It is proposed that this case study be conducted with the Institut Technique of Nabeul and the Cap-Bon regional office of ONAS. The WASH team will assist with the design of the demonstration project.

It is expected that the three cases will take into consideration the technical, social, and financial aspects of the specific systems which will be developed.

6.5 Workshop Organization and Implementation (Phase 3)

A one- to two-day workshop will be organized to present the draft strategy document to professionals and administrators who are involved or interested in sewage disposal management in Tunisia. The workshop will provide an opportunity for participants to review the strategy, become fully informed on proposed technologies and approaches, and become cognizant of successes and failures which have been encountered in the development or implementation of new sewage disposal systems in Tunisia.

Special subjects such as cost recovery and financing, legislation and enforcement, private sector participation, and the appropriateness and usefulness of applied research will be considered for discussion. Finally, the results of the case studies will be presented at that workshop.

Another purpose of the workshop is to familiarize all represented agencies and/or sectors with the proposed national strategy. Soon after the workshop, recommended changes will be made to the draft document and a final version will be prepared by the working group with WASH team assistance.

The workshop is to be organized by the MOPWH. The working group will be able to assume responsibility for organizing only the technical component of the workshop. The administrative component of the workshop should be handled either by the MOPWH and/or RHUDO, or be contracted out.

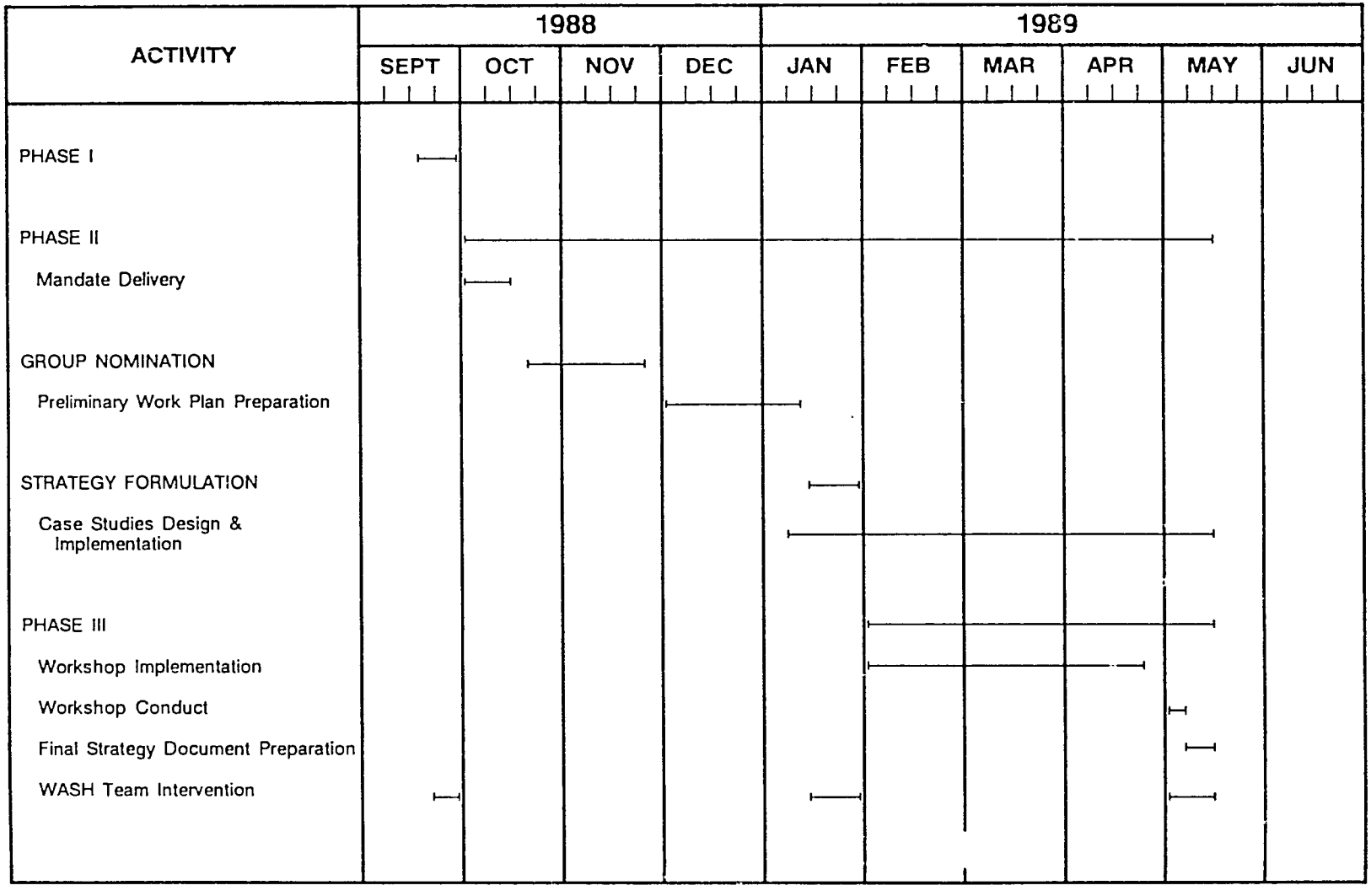
This phase or activity will require a minimum of three months for preparation, two days for implementation, and another three days for revising the final document and debriefing the MOPWH.

6.6 National Strategy Development Activity Schedule

It is estimated that the implementation of Phases 2 and 3 of the national sewage disposal strategy will require a minimum of nine months. An activity schedule for this undertaking is presented in Table 2.

Table 2

NATIONAL SEWAGE DISPOSAL STRATEGY DEVELOPMENT ACTIVITY SCHEDULE



Chapter 7

PROPOSED WASH INTERVENTIONS

At the request of the MOPWH and with the approval of RHUDO/Tunis, WASH is to perform a key role in the development of a national strategy for sewage disposal in areas not served by ONAS. WASH will assist the national working team and Tunisian educational and research institutions in implementing the remaining phases of the endeavor. Recommended specific interventions by WASH are as follows:

WASH is to provide a team of experts composed of the following disciplines:

- sanitary engineer/chief of party,
- management/organization planning specialist,
- social anthropologist and human resource development specialist, and

The MOPWH will provide a hydrogeolist as part of the team.

Members of this team should possess the broad capability to provide technical assistance coverage in all areas involved in formulating the national strategy for sewage disposal. Specifically, the WASH team will need expertise in the following areas:

- urban wastewater systems design, construction, operations and maintenance,
- groundwater management,
- hydraulic engineering,
- private sector organization and development,
- community organization and education,
- institution planning,
- legislation and enforcement of regulations,
- human resource development,
- demonstration project/applied research design and evaluation, and

sewage systems financing and cost recovery.

In order to complete the WASH team it is also proposed that RHUDO provide the services of a local private sector consulting architect with experience in the national housing development projects. The architect's role would be to provide housing development expertise needed in developing the strategy. Ideally, this person would be part of the team and be available for two of the three weeks.

The proposed methodology for WASH interventions in Phases 2 and 3 is as follows:

- Prior to going to Tunisia, the WASH team will spend a period of one week in the United States to read background documents and develop a preliminary plan for the assignment, including the outline for the case studies/demonstration projects.

- The WASH team will then travel to Tunisia for a period of three weeks where it will carry out the strategy with the Tunisian working group and the relevant institutions.

- The WASH team will then return to Tunisia for a two-week period for the workshop and the preparation of the final strategy document.

- The WASH team will prepare a final report for RHUDO/Tunis and the MOPWH.

Appendix A

SCOPE OF WORK

Article I - Title:

Study on Alternative Low Cost Sewage Disposal Methods in Tunisia

Article II - Background and Objectives

Unlike many other countries, in Tunisia there is no national combined water and sewer authority. There is a national water authority, SONEDE, which provides water service to both urban and rural areas. However, the major sewer authority, ONAS, only has legal jurisdiction to operate within legislatively mandated boundaries within certain primary and secondary cities.

Outside these boundaries, the institutional responsibilities for sewer installation and maintenance are not clear nor are there norms or systematic approaches to sewage disposal. Sewer collection systems, septic tanks and other sewage disposal systems are currently being built with no specific attention to possible future hygiene and contamination problems and with no special attention to the operation and maintenance of the system.

The objectives of this study are to examine alternatives for sewage disposal in areas not covered by ONAS, to select appropriate sewage disposal methods and to set forth a strategy to promulgate and implement the selected alternative sewage disposal methods.

Article III - Statement of Work

The study will be conducted in two separate, but interrelated phases:

Phase I: The contractor will undertake a diagnostic study of the sewer alternatives in use in Tunisia outside the service area of ONAS. On the basis of this diagnosis and other available information such as soil maps, water maps, water consumption statistics, etc., the contractor will recommend low cost alternative sewage disposal methods suitable under different environmental conditions in the various areas of the country which are not currently served by ONAS.

The purpose of this first phase is to start on interactive process with the Tunisian authorities.

To the extend possible, the contractor is to provide preliminary information and suggestions in support of the proposed alternative sewage disposal methods. Such information is intended to assist the Tunisian authorities in weighing the costs and benefits of the various alternatives.

Finally, the contractor, in consultation with RHUDO and the Tunisian authorities, will help to refine and detail the scope of work for the second phase of activities, which is outlined below. The contractor should also recommend specific qualified individuals to carry out the second phase of this program.

The level of effort for Phase I of this study is estimated to be 3 person weeks.

Phase II: The second phase is to begin after the Tunisian authorities have had the opportunity to review the recommendations provided in Phase I. The Ministry of Public Works and Housing will assign experts to work collaboratively with the contractor's team. The team and the Tunisian experts will develop the details of the various alternative sewage disposal methods so that a final selection of preferred methods (under varying circumstances) may be made. Based upon the information developed the preferred alternatives will be selected.

The team, working collaboratively with the Tunisian experts, will then help to develop a detailed strategy to promulgate and implement the selected alternatives. This detailed strategy should include plans for developing technical specifications, norms and standards, institutional roles, public acceptance and educational programs, operations and maintenance considerations and cost recovery methodologies.

During Phase II, the team will conduct a workshop to present the various alternatives to a wider group of concerned Tunisian professionals.

The level of effort for Phase II of this study is estimated to be 9 person weeks.

Article IV - Reports

The work is to commence o/a September 19, 1988 and is to be completed o/a January 15, 1988.

First Phase - At the end of the first phase, the contractor is to submit a report summarizing its findings and recommendations. The report shall be prepared in the French language. Ten copies shall be provided to RHUDO/NENA for distribution to the Ministry of Public Works and Housing and to other interested parties. The report (in French) should be sent to RHUDO/NENA within 15 days of the team's return to the U.S. A draft of the report (in English) should be provided to RHUDO/NENA prior to the consultant's departure from Tunis.

Second Phase - At the end of the second phase, the contractor is to submit a report which includes summary information on each of the sewage disposal methods considered and explains the rationale for choosing the selected alternatives. The report shall also present the full detailed strategy, outlining the steps to promulgate and implement the selected sewage disposal methods. The report shall be prepared in the French Language. Ten copies shall be provided to RHUDO/NENA for distribution to the Ministry of Public Works and Housing and to other interested parties. The report should be sent to RHUDO within 15 days of the team's return to the U.S.

Together with this report, the Contractor shall provide prototypical sets of regulations, norms, standards, manuals, handbooks, technical drawings, administrative notices, etc., which in its judgement will be helpful in guiding the Tunisian authorities in their efforts to institutionalize the selected sewage disposal methods.

Article V - Qualifications of Consultants

In addition to a Civil Sanitary Engineer, the individuals provided by the contractor to carry out this assignment may include an Institutional Development Specialist and/or a sociologist with prior experience in alternative sewage systems. All consultants shall be fluent in the French language and shall have had previous, relevant overseas development experience, preferably in Francophone countries.

Article VI - Relationship and Responsibilities

The consultant will work closely with Samir Kanoun of RHUDO/NENA and under the general direction and supervision of Alexandria Lee Panehal, Senior Housing Advisor, RHUDO/NENA. Mr. Jemal Rafrafi, Director General of Housing at the Ministry of Public Works and Housing shall be the primary Tunisian counterpart. Other Tunisian institutions which are likely to play an important role in this assignment include: The National Sewage Authority (ONAS), selected Municipalities and the Regional Offices of the Ministry of Public Works and Housing.

Article VII - Terms of Performance

The work described in Article III above, is to be performed within a total period of 16 weeks. The expected starting date is September 19, 1988. A six day work week is authorized for consultants while in the field.

It is anticipated that the report required in the first phase (Article IV) will be submitted to RHUDO/NENA and to the Ministry of Public Works and Housing by the end of the fifth week. After the Ministry has had the opportunity to review the first phase report and upon notification by RHUDO/NENA, the contractor's team shall return to Tunisia to carry out the work of the second phase.

REPUBLIQUE TUNISIENNE

Ministère de l'Equipement

et de l'Habitat

N° 17. 7/1

Monsieur David OLINGER

Directeur RHUDO

Mission U.S.A.I.D

28, Rue Suffex - Notre Dame

T U N I S

OBJET : Etude d'établissement de normes en matière d'assainissement.

Au cours de notre entretien, j'ai eu l'occasion de vous confirmer notre intérêt à établir des normes d'assainissement des zones non desservies par l'ONAS.

Comme vous l'avez suggéré, il serait souhaitable d'entreprendre une étude exploratoire sur le sujet en vue d'élaborer une stratégie en la matière.

Cette étude devrait démarrer dans les meilleurs délais et serait réalisée par une équipe de consultants désignée par vos soins travaillant en étroite collaboration avec l'Administration.

Veuillez agréer, Monsieur le Directeur, l'expression de mes salutations distinguées.

ACTION	~~DIR~~
DIR ✓	
EXO	
PER	
PROG	
TRG	
PM	
CONT	
HPN	
RHUDO ✓	
P. C.	
EMB/ADMIN	
EMB/GSO	
POL	
ECON	
C & R USAID	
CHRON ✓	
AF	

Appendix B

PHASE I - CONSULTANCY ACTIVITY SCHEDULE

Appendix B

CONSULTANCY ACTIVITY SCHEDULE IN TUNISIA

September 19 - 30, 1988

- Monday 19 September -

Briefings at USAID with RHUDO Representatives (Fathi Kraiem, Sonia Hammam, David Olinger)

Review of Reports and other documents related to RHUDO activities Housing and Urban Sanitation

- Tuesday 20 September -

Review with RHUDO and finalize proposed Assignment (Phase I) workplan

Meeting With Mr Aras Turki, Secretary General of the Ministry of Equipment and Housing

- Wednesday 21 September -

Meetings with ONAS Directors of Studies and Planning, and Operations (Engineers Mohamed Larbi Krouf and Mohamed Saied)

Meeting with Ministry of Public Health Director of Environmental Health and Environmental Control (Engineer Sadok Atallah)

Meeting with the Ministry of Interior's District of Tunis Direction of Urban Development and Control (Ms Hemda Gafsi, Director; Mrs Amina Ben Hadid, Chief of Service; and Engineers Mondher Haltiti, Belgacem Ayed, and Lofti Masla)

- Thursday 22 September -

Meetings with ONAS President Director General (Engineer M. Mlika) and Directors of Studies and Planning (M. L. Krouf) and Director of Projects (Engineer Fadhel Ghariani)

Meeting with RHUDO Housing Consultant (Architect Khaled Sahnoun)

Meeting with Ministry of Interior's Tunis District Engineers

Field Trip to Soukra/Choutrana Area (visit of sewage treatment facilities of ONAS and area lay-out)

- Friday 23 September -

Meeting with ONAS Regional Director for the Cap-Bon Region (Engineer Brahim Guidria) in Nabeul

Meeting with Private Entrepreneur In Process of Obtaining license for new Sewage Disposal Systems Maintenance Firm (Engineer Mohamed Abdelmoula Marzougui), in Nabeul

Meeting with Director Institut Superieur Technique de Nabeul (Tahar Ben Lakhdar) in Nabeul

Field Visit to Municipality Sewage Outfall of Bou Argoub Commune and meeting with the President and Chief Technician de la Commune de Bou Argoub.

- Saturday 24 September -

Meetings with Private Sector Firms:

.. Société Tunisienne d'Assainissement (STAS) Director, Mr Abdelwaheb Zayani

.. Société d'Entretien des Réseaux (SER) Director, Mr Hassen Loukil

- Sunday 25 September -

Review Information and Documents Collected

Travel To Sfax

- Monday 26 September -

Meeting with ONAS Management Staff For Southern Region of Tunisia (Sfax, Gabès, Medenine, Gafsa, Tozeur, Sidi Bouzid): Engineers Mohamed Turki, Regional Director; Mohamed Hammami, Chief of Operations; Sleheddine Chaabouni; Chief of Projects.

Meeting with Chief of Sous-Direction des Travaux, Municipality of Sfax (Engineer Hafed Triqui)

Meeting with Private Sanitation Firm HYDAS (Mr Ghrairi Med. Sellami, Director)

Field visit of autonomous sewage disposal for housing development project in Sidi Salah.

- Tuesday 27 September -

Meeting with ONAS Direction for Central Region (Sousse, Mahdia, Kairouan, Kasserine (Engineer Mahmoud AOUN, Regional Director)

Field Visit of RHUDO funded Housing Development Project and Municipality of Bou Ficha.

- Wednesday 28 September -

Field visits Debriefing with RHUDO (F. Kraiem)

Meeting with Department of Hydraulic of the Ecole National d' Ingénieurs de Tunis (Mr Mustapha Bèsbès, Department Director, and Dr Khelifa Maalel, Lecturer-Researcher)

Preparation of Presentations to RHUDO and the Ministry of Equipment and Housing

- Thursday 29 September -

Presentation of Findings to RHUDO (David Olinger, Samir Khamoun, Alexi Panehol, and Fathi Kraiem)

Presentation of Findings to Ministry of Equipment and Housing (Mr Aras Turki, Secretary General)

Preparation of Draft Report for Phase I

- Friday 30 September -

Meetings with ONAS Direction of Studies and Planning (Engineer M.L. Krouf, Director and Mr Nejib Abid, Statistician)

Meeting with the Director of Urbanism of the Municipality of Tunis (Mr Fathi Ennafer, officially named Director of Aménagement du Territoire of the MOEH on the same day of meeting)

Debriefings with RHUDO (D.Olinger, S.Khamoun, F. Kraiem)

Appendix C

LEGISLATION FOR THE CREATION OF THE AGENCE NATIONALE DE PROTECTION DE L'ENVIRONNEMENT

Loi n° 88-91 du 2 août 1988 portant création d'une agence nationale de protection de l'environnement (1).

Au nom du peuple,

La chambre des députés ayant adopté,

Le Président de la République promulgue la loi dont la teneur suit :

CHAPITRE PREMIER

Nature et attributions de l'agence

Art. 1er — Il est créé un établissement public à caractère industriel et commercial doté de la personnalité civile et de l'autonomie financière dénommé : « agence nationale de protection de l'environnement ».

L'agence est régie par la législation commerciale dans la mesure où il n'y est pas dérogé par la présente loi.

Elle est placée sous la tutelle du Premier ministère, son siège est fixé à Tunis.

L'organisation administrative et financière de l'agence et les modalités de son fonctionnement et de la tutelle de l'Etat seront fixées par décret.

Art. 2. — On entend par pollution au sens de la présente loi, toute introduction directe ou indirecte d'un polluant, biologique, chimique ou physique dans l'environnement.

On entend par environnement au sens de la présente loi le mode physique y compris le sol, l'air, la mer, les eaux souterraines et de surface (cours d'eau, lac, lacune et sebkhat et assimilé...) ainsi que les espaces naturels, les paysages, les sites et les espèces animales et végétales et d'une manière générale tout le patrimoine national.

Art. 3. — L'agence nationale de protection de l'environnement a notamment pour mission :

— de participer à l'élaboration de la politique générale du gouvernement en matière de lutte contre la pollution et de protection de l'environnement, et sa mise en œuvre par des actions spécifiques et sectorielles ainsi que des actions globales s'inscrivant dans le cadre du plan national de développement.

— de proposer aux autorités compétentes toute mesure revêtant un caractère général ou particulier et destinée à assurer la mise en œuvre de la politique de l'Etat en matière de lutte contre la pollution et de préservation de l'environnement, et notamment toute mesure tendant à assurer la sécurité de l'environnement, à renforcer les mécanismes qui y conduisent et en général à promouvoir les mesures de prévention des risques et des catastrophes naturelles ou industrielles.

— d'élaborer un plan national d'urgence et d'intervention pour les cas de pollution accidentelle ou des risques extérieurs menaçant l'équilibre de l'environnement et la qualité de la vie.

— de veiller à l'exécution de ce plan d'urgence et éventuellement à son adaptation en fonction des impératifs spécifiques ou conjoncturels de façon à faire respecter les normes d'installation de tout projet revêtant un caractère industriel, agricole ou commercial ayant un impact négatif sur l'état de l'environnement.

— de promouvoir le droit de l'environnement et de la qualité de la vie par des mesures à caractère général ou particulier et par le respect des normes d'équilibre du milieu naturel.

— de lutter contre toutes les sources de pollution, de nuisances et toutes les formes de dégradation de l'environnement.

— d'établir en collaboration avec les départements et les organismes concernés, des normes déterminant les seuils de pollution des rejets de projets industriels, énergétiques, urbains, agricoles et de transport et de veiller à leur application.

— d'agréer les investissements dans tout projet ayant vocation à concourir à la lutte contre la pollution et la protection de l'environnement.

— de coordonner les programmes nationaux et internationaux en matière de lutte contre la pollution et de protection de l'environnement.

— de contrôler et de suivre les rejets polluants et les installations de traitement de tout rejet.

— de représenter la Tunisie auprès des instances internationales et au réunions bilatérales et multilatérales ayant pour objet la lutte contre la pollution et la protection de l'environnement ainsi qu'auprès des organismes similaires, étrangers revêtant un caractère national ou international avec lesquels elle est habilitée à coopérer en étroite collaboration avec le ministère des affaires étrangères.

— de veiller à la mise en application des engagements souscrits dans le cadre international en matière de lutte contre la pollution et de protection de l'environnement.

— suivre en collaboration avec les départements ministériels et organismes intéressés les actions de recherche à caractère scientifique, technique ou économique en relation avec l'environnement.

— de promouvoir toute action de formation d'éducation, d'étude et de recherche en matière de lutte contre la pollution et la protection de l'environnement.

Art. 4. — Dans le cadre de l'accomplissement de sa mission l'agence nationale de protection de l'environnement peut intervenir sur l'ensemble du territoire tunisien et notamment dans les espaces maritimes relevant de la souveraineté ou de la juridiction tunisienne.

Art. 5. — Une étude d'impact sur l'environnement doit être présentée à l'agence avant la réalisation de toute unité industrielle agricole ou commerciale dont l'activité présente de par sa nature ou en raison des moyens de production ou de transformation utilisés ou mis en œuvre des risques de pollution ou de dégradation de l'environnement.

Un décret fixera les conditions d'application du présent article.

Art. 6. — Dans le cadre de ses interventions en matière de protection de l'environnement, l'agence est habilitée à conclure des conventions avec les organismes ou entreprises concernés en vue d'arrêter un programme d'élimination des rejets polluants. Les établissements qui acceptent de telles conventions peuvent bénéficier d'avantages fiscaux ou d'une aide financière dont le montant et les conditions d'octroi seront fixés par décret.

Art. 7. — Les investissements destinés à protéger l'environnement et agréés par l'agence bénéficient des avantages suivants :

— Suspension provisoire des droits de douane et des taxes sur le chiffre d'affaires perçus sur les matériels, les équipements et les produits importés, nécessaires à la réalisation des programmes de lutte contre la pollution.

Toutefois cette suspension ne s'applique pas aux matériels, équipements et produits importés lorsque des biens similaires sont fabriqués localement.

— Suspension provisoire des taxes sur le chiffre d'affaires perçues sur l'acquisition des matériels, équipements et produits fabriqués localement.

— Amortissement des investissements concernés suivant un taux annuel de 25%.

— Financement des crédits afférents aux investissements à des conditions préférentielles de la banque centrale de Tunisie.

Art. 8. — Tout établissement industriel, agricole ou commercial et toute personne physique ou morale dont l'activité est susceptible de polluer l'environnement sous forme de rejet de déchets solides, liquides, gazeux ou autres sont tenus de procéder à l'élimination ou à la réduction de ces rejets et éventuellement à la récupération des matières rejetées.

(1) Travaux préparatoires :
Discussion et adoption par la chambre des députés dans sa séance du 20 juillet 1988.

Un décret fixera les conditions d'application du présent article et notamment les normes et prescriptions générales applicables aux rejets de polluants mentionnés ci-dessus.

Art. 9. — L'agence est obligatoirement consultée avant l'établissement de toute convention concernant l'évacuation ou l'utilisation de tout déchet ou sous produit industriel.

Un décret fixera les conditions d'application du présent article.

CHAPITRE II

Contrôle et sanctions

Art. 10. — L'agence assure le contrôle du fonctionnement, de l'efficacité et du rendement des installations de traitement des rejets ou de leur destruction mentionnés à l'article 8 de la présente loi.

Ce contrôle est effectué par ses propres experts dûment habilités à cet effet dont les statuts sont déterminés par décret. L'agence peut procéder à ce contrôle par sous-traitance le cas échéant.

Art. 11. — Les contrevenants aux dispositions de l'article 8 de la présente loi et aux textes pris pour son application sont passibles d'une amende variant entre 100 dinars et 50.000 dinars, selon le degré de gravité de ces infractions.

La condamnation ne dispense en aucun cas l'auteur de l'infraction des obligations mentionnées à l'article 8 de la présente loi et les textes pris pour son application.

La juridiction compétente peut prononcer la fermeture de l'établissement en infraction.

Toutefois l'agence est habilitée à transiger avec les personnes physiques et morales en infraction.

La conclusion d'une transaction arrête les poursuites.

Art. 12. — Les infractions à la présente loi et aux textes pris pour son application sont constatées par des procès-verbaux dressés par les agents assermentés et habilités à cet effet, et relevant de l'agence ou des ministères concernés.

Ces procès-verbaux sont transmis par la voie hiérarchique au procureur de la République aux fins des poursuites.

Art. 13. — L'agence peut prêter toute assistance tendant à la réparation de tout préjudice subi par l'environnement demandée conformément à la législation en vigueur.

CHAPITRE IV

Dispositions diverses

Art. 14. — Les ressources de l'agence sont constituées notamment par

— les dotations et subventions de premier établissement ou d'équilibre nécessaires au fonctionnement de l'agence qui lui sont allouées sur le budget de l'Etat.

— toutes redevances et taxes prévues par la législation en vigueur et perçues au titre de la lutte et de la protection de l'environnement et transférées au profit de l'agence par décret.

— le produit des amendes et des transactions prévues à l'article 11.

— les emprunts de toute nature que l'agence est autorisée à contracter conformément à la législation en vigueur.

— toutes autres ressources qui proviendraient de son action ou de la gestion de ses biens.

— les subventions, dons et legs qui lui seront accordés par toute personne physique ou morale tunisienne ou étrangère.

— la contre valeur de l'assistance directe, services, biens meubles et immeubles que l'agence peut recevoir des organismes d'assistance étrangers, publics ou privés.

— les contributions éventuelles des entreprises concernées.

Art. 15. — L'agence bénéficie d'une exonération de tout droit et taxe douanière pour l'acquisition de tout équipement, matériel et produit nécessaires à l'accomplissement de sa mission.

L'agence bénéficie des avantages fiscaux suivants :

— enregistrement au droit fixe de tout contrat qu'elle sera amenée à conclure avec des tiers.

— exonération de la taxe sur les travaux et prestations de services qui sont effectués par et pour le compte de l'agence ou toute autre taxe à créer ou qui viendrait en substitution.

— exonération de toutes les taxes portant sur les recettes de l'agence

Art. 16. — Les créances de l'agence bénéficiant du privilège général du trésor.

Art. 17. — Le recouvrement des créances de toute nature de l'agence est poursuivi au moyen d'états de liquidation délivrés conformément à la législation en vigueur. Ces états de liquidation sont dressés par le président directeur général de l'agence et rendus exécutoires par le ministre des finances.

Art. 18. — En cas de dissolution de l'agence, son patrimoine fera retour à l'Etat qui exécutera les engagements contractés par l'agence.

La présente loi sera publiée au *Journal officiel de la République tunisienne* et exécutée comme loi de l'Etat.

Fait à Tunis, le 2 août 1988.

ZINE EL ABIDINE BEN ALI

Loi n° 88-92 du 2 août 1988 sur les sociétés d'investissement (1).

Au nom du peuple,

La chambre des députés ayant adopté,

Le Président de la République promulgue la loi dont la teneur suit :

Art. 1er. — Les sociétés d'investissement sont des sociétés anonymes dont la mission concourt à la mobilisation par voie publique de l'épargne, au développement du marché financier et à la promotion des investissements.

Art. 2. — Les sociétés d'investissement peuvent être créées dans le cadre de l'une des deux catégories suivantes :

— Sociétés d'investissement à capital fixe.

— Sociétés d'investissement à capital variable.

Elles sont régies par les dispositions du code de commerce dans la mesure où il n'y est pas dérogé par la présente loi.

TITRE I

Les sociétés d'investissement à capital fixe

Art. 3. — Les sociétés d'investissement à capital fixe ont pour objet la gestion au moyen de l'utilisation de leurs fonds propres, d'un portefeuille de valeurs mobilières.

Elles sont également autorisées à effectuer les opérations connexes et compatibles avec cet objet.

Art. 4. — Les sociétés d'investissement à capital fixe doivent satisfaire aux conditions suivantes :

1) Le capital libéré minimum ne peut être inférieur à 100.000 dinars.

2) La valeur nominale de l'action ne peut excéder 10 dinars.

3) La société d'investissement à capital fixe dont le capital est inférieur à 5 millions de dinars ne peut détenir d'actions représentant plus de 30% du capital d'une même société.

4) La société d'investissement à capital fixe ne peut employer plus de 15% de son capital et de ses réserves en titres évalués à leur valeur nominale émis par une même entreprise sauf s'il s'agit de

(1) Travaux préparatoires :
Discussion et adoption par la chambre des députés dans sa séance du 20 juillet 1988.

Appendix D

REGISTERED PRIVATE SECTOR SANITATION COMPANIES IN TUNISIA

ANNEX 4

REGISTERED PRIVATE SECTOR SANITATION COMPANIES IN TUNISIA

- GABES -

Société d'Assainissement et de Nettoyage Industriel (SOASNIC)

- SFAX -

Entreprise de Nettoiement et d'Assainissement (ENAS)

Société d'Hygiène, de Désinfection, et d'Assainissement (HYDAS)

Entreprise de Nettoyage et d'Assainissement (NETAS)

Société Tunisienne d'Assainissement Industriel et Pétrolier (STAS)

- SOUSSE -

Société d'Assainissement et d'Hygiène (SOUSSANA)

Agence de Prestation de Service (APS)

Etablissement Ladhari

Coopérative Oléicole de Tunisie (COT)

- TUNIS -

ETTATHIR

HYGIENE TUNISIE

Société d'Assainissement et de l'Environnement (SOTASE)

Contrôle Assainissement de Tunisie (CAT)

Société Tunisienne d'Assainissement Industriel et Pétrolier (STAS)

Société Générale d'Hygiène et d'Assainissement (3.D)

Service d'Entretien des Réseaux (SER)

Entreprise d'Assainissement Moderne

Appendix E

LA LEGISLATION EN VIGEUR

2.- LA LEGISLATION EN VIGUEUR

2.1- Régime juridique des eaux en général :

Loi N°75-16 du 31 Mars 1975, portant promulgation du Code des Eaux ;

Décret N°78-814 du 1er Septembre 1978, fixant les conditions de recherche et d'exploitation des eaux souterraines ;

2.2.- Législation sur le régime administratif de la gestion des eaux :

- Décret du 30 Juillet 1936, portant organisation des groupements d'intérêt hydraulique (J.OT du 7 Août 1936), modifié par décret du 17 Mars 1949 (JOT du 29/3/1949 n°25).

Decret du 11 Janvier 1945, portant organisation des plans d'aménagement rural ;

Décision SEA du 18 Octobre 1961, portant fusion du Groupe de l'Hydraulique et des Aménagements Ruraux (HAR) et le Service du Génie Rural (GR) pour former le Groupe de l'Hydraulique et de l'Equipement Rural.

Loi N°68-22 du 2 Juillet 1968, portant création de la SOMEDE (abrogée par la loi créant ONAS).

Loi N°69-2 du 20 Janvier 1969 relative à l'organisation sanitaire, modifiée par la loi N°69-61 du 23 Décembre 1969.

Décret N°74-93 du 15 Février 1974 fixant les attributions du Ministère de l'Equipement (J.O.T. du 19 Février 1974).

Loi N°74-73 du 3 Août 1974, portant création de l'Office National d'Assainissement (ONAS) ;

Décret N°75-342 du 20 Mai 1975, fixant les attributions du Ministère de l'Intérieur (J.O.T. du 10 Juin 1975).

Decret N°75-538 du 4 Août 1975 portant attributions du Ministè de l'Economie Nationale (JOT du 8/12/1975).

Décret N°77-648 du 5 Août 1977, portant attributions du Ministère de l'Agriculture (JOT. du 12/16 Août 1977 N°54).

Décret N°78-419 du 15 Avril 1978, fixant les compositions et le modalités de fonctionnement du Comité National de l'Eau ;

Décret N°81-793 du 9 Juin 1981, portant organisation des services de l'Administration Centrale du Ministère de la Santé Publique ;

Décret N°81-225 du 18 Février 1981, portant organisation et attributions des Directions Régionales de la Santé Publique, modifié par le décret N°82-758 du 3 Mai 1982.

Loi N° 77/17 du 16 Mars 1977, portant création de l'agence de la Réforme agraire des périmètres publics irrigués.

Loi N° 78-44 du 1er Août 1978, portant création de l'Office de Développement de Tunisie Centrale modifiée par la loi N° 80-31 du

Circulaire N° 91 du 3 Juin 1980 du Ministère de la Santé Publique portant fonctionnement des conseils centraux et locaux de la Santé.

2.4.- Législation sur les utilisations des eaux :

2.4.1.- Usages domestiques et municipaux :

Décret N°70-226 du 8 Juillet 1970, portant approbation du règlement des abonnements à l'eau;

Décision municipale de la ville de Tunis du 5 Juillet 1951 pour la protection de l'eau douce ;

2.4.2.-Usages au niveau rural :

Arrêté du 23 Novembre 1936 du Secrétaire Général du Gouvernement sur l'alimentation en eau des zônes rurales.

2.4.3.- Les autres utilisations :

Arrêté du 21 Décembre 1983 du Ministère de l'Agriculture portant autorisation d'irrigation avec les eaux usées ;

Loi N°63-18 du 27 Mai 1963 (4 Moharrem 1383) portant réforme dans les périmètres publics irrigués, modifiée et complétée par la loi N°71-9 du 16 Février 1971 .

2.5.- Législation sur les effects nuisibles des eaux :

Décret du 6 Octobre 1949 (14 Hadja 1368) relatif à la défence et à restauration des sols;

Loi du 7 Octobre 1958 sur le travail obligatoire en courbes de niveau;

Loi N°59-96 du 20 Août 1959 (15 Safar 1379) portant promulgatic du Code Forestier, revisée par la loi N°66-60 du 4 Juillet 1966.

2.6.- Législation sur le gaspillage, la qualité, la pollution et assainissement :

2.6.1.- AU niveau national.

Arrêté du 5 Juillet 1908 (réglement sanitaire); selon l'articl 90 de cet arrêté "il est interdit de déverser des matières de vidanges ou des eaux d'égoût sur les champs où sont cultivés à ras du sol des légumes ou des fruits susceptibles d'être consommés crus. L'aspersion d'eau d'égoût sur tous les légumes et fruits ainsi que leur lavage à la dite eau sont rigoureusement interdits.

Décret N°68-88 du 28 Mars 1968, concernant les établissements dangereux, insalubres ou incommodes.

Décret N°85-56 du 2 Janvier 1985 relatif à la règlementation les rejets dans le milieu récepteur.

.../...

2.6.2.- Au niveau communal :

Décret N°79-768 du 8 Septembre 1979 réglementant les conditions de branchement et de déversement des affluents dans le réseau public d'assainissement (ONAS).

2.6.3.- En zones rurales :

Arrêté du 1er Août 1920 du Directeur Général des Travaux Publics réglementant l'utilisation des points d'eau publics situés en dehors des périmètres communaux et à l'intérieur de ceux-ci lorsqu'il n'existe pas de périmètre local ;

..7.- Législation au niveau international :

Convention Africaine pour la conservation de la nature et des ressources naturelles, Alger, 15 Septembre 1968, ratifiée par la loi N°76-91 du 4 Novembre 1976;

Convention internationale de Londres du 12 Mai 1954 pour la prévention de la pollution des eaux de la mer par les hydrocarbures, amendée en 1962, rectifiée par la loi N°73-9 du 22 Mars 1973;

Convention internationale sur la responsabilité civile pour les dommages dûs à la pollution par les hydrocarbures de Bruxelles du 29 Novembre 1969, amendée en 1973, ratifiée par la loi N°76-13 du 13 Janvier 1976;

Convention internationale sur l'intervention en haute mer en cas d'accident entraînant où pouvant entrainer une pollution par les hydrocarbures, conclue à Bruxelles, le 29 Novembre 1969, ratifiée par la loi N°76-14 du 21 Janvier 1976;

Convention sur l'intervention en haute mer en cas de pollution par des substances autres que les hydrocarbures, conclue à Londres, le 2 Novembre 1973, ratifiée par la loi N°76-14 du 21 Janvier 1976;

.../...

Convention internationale pour la prévention de la pollution par les navires, conclue à Londres le 2 Novembre 1973 et amendée en 1978, rectifiée par la loi 76-15 du 21 Janvier 1976 ;

Convention internationale portant création d'un fonds international d'indemnisation pour les dommages dûs à la pollution par les hydrocarbures, conclue à Bruxelles le 18 Décembre 1971 et amendée en 1976, ratifiée par la loi N°76-16 du 21 Janvier 1976;

Convention sur la prévention de la pollution des mers résultan de l'immersion des déchets et autres substances, conclue à Londres, Moscou, - Mexico et Washington, le 29 Décembre 1972, amendée en 1978 à Londres, ratifiée par la loi N°76-17 du 21 Janvier 1976.

Convention pour la protection de la Méditerranée contre la pollution conclue à Barcelone en 1976 et des deux protocoles y afférants relatifs à :

. la prévention de la pollution par les opérations d'immersion effectuées par les navires et aeronefs,

. La coopération en matière de lutte contre la pollution en cas de situations critiques ratifiée par la loi N°77-29 du 25 Mai 1977.

2.8. Législation sur les aspects économiques et financiers :

Arrêté du Directeur des Finances et du Directeur des Travaux Publics du 14 Mars 1953 (27 Djouma II 1372) fixant les redevances pour l'utilisation des eaux du Domaine Public et pour l'occupation du Domaine Public Fluvial;

Arrêté des Secrétaires d'Etat aux Finances, au Commerce et à l'Industrie et à l'Agriculture du 19 Juillet 1958 (2 Moharem 1378) attribuant des encouragements aux agriculteurs pour la création et l'aménagement des points d'eau privés;

Décret N°64-81 du 12 Mars 1964 (28 Chaoual 1383) portant encouragement de l'Etat à la conservation des eaux et du sol:

Décret N°64-77 du 12 Mars 1964 (28 Chaoual 1383) portant encouragement de l'Etat à l'irrigation par points d'eau privés:

Arrêté des Secrétaires d'Etat au Plan et aux Finances et à l'Agriculture du 12 Mars 1964, relatif à la fixation des subventions et Prêts agricoles pour l'encouragement à l'irrigation par points d'eau Privés:

Loi N°63-17 du 27 Mai 1963 (4 Moharram 1383) portant encouragement de l'Etat au Développement de l'Agriculture;

.../...

Décret N°72-171 du 10 Mai 1972, réglementant l'aide de l'Etat à la création de points d'eau privés et de périmètres irrigués;

Décret N°75-201 du 29 Mars 1975 portant institutions des redevances d'assainissement, modifié et complété par le décret N°78-972 du 7 Novembre 1978;

Arrêté du 28 Avril 1977, relatif à la fixation des taux des subventions et prêts à accorder aux exploitants agricoles au titre de l'encouragement de l'Etat à la création de points d'eau privés et de périmètres irrigués.

Arrêté des Ministres des Finances et de l'Agriculture du 28 Décembre 1978, fixant les taux des redevances accessoires des abonnements à l'eau.

2.9.- Autres Législations importantes :

Décret du 1er Janvier 1953 (13 Rabia II 1372) sur les mines ;

Loi N°58-63 du 11 Juin 1958 (23 Dhou El Kaada 1377) modifiée par la loi N°60-6 du 26 Juillet 1960 (1 Safar 1380) portant réforme agricole dans la Basse Vallée de la Mejerdah;

Loi N°65-5 du 12 Février 1965 (11 Chaoual 1384) portant promulgation du code des droits réels.

Decret N° 82-131 du 24 Septembre 1982 portant création de l'INNORPI et decret N° 83-724 du 4 Août 1983 fixant les catégories de normes et les modalités pour leur élaboration et diffusion et decret N° 82-66 du 6 Août 1982 relative à la normalisation et à la qualité.-

3.- REGIME JURIDIQUE DES EAUX EN GENERAL

3.1. Propriété des eaux :

En Tunisie, toutes les ressources en eau qu'elles soient superficielles ou souterraines, font partie du domaine public.

Selon l'article premier du Code des Eaux (Loi N°75-16 du 31 Mars 1975), font partie du domaine public hydraulique:

"- Les cours d'eau de toutes sortes et les terrains compris dans le franc bord;

- les retenues établies sur les cours d'eau
- les sources de toute nature
- les nappes d'eau souterraines de toute sorte
- les lacs et sebkhas
- les acqueducs, puits et abrevoirs à usage du public ainsi que le dépendances
- les canaux de navigation, d'irrigation ou d'assainissement exécu par l'Etat ou pour son compte dans un but d'utilité publique ai que les terrains qui sont compris dans leur franc bord et leur dépendance".

Ce même code stipule que les droits de propriété d'eau existants, particulièrement dans les oasis du Sud à la date de la promulgation du code seront reconnus et convertis en droits d'usage d'eau portant sur un volume équivalent aux droits de propriété (article 21). Une commission de Purge des droits d'eau est établie dans le but de déterminer ces droits.

3.2.- Réglementation des eaux publiques :

Les eaux publiques (ou domaniales) ne peuvent pas faire l'objet d'acquisition étant donné que le domaine public est inaliénable et non passible de droits de prescription. Toutefois, bien que le principe du domaine public est officiellement en vigueur, souvent la population des régions concernées se comporte comme si les intéressés étaient individuellement ou collectivement propriétaires de l'eau et non seulement d'un dr d'utilisation. Celà est particulièrement vrai dans les zônes rurales où l'incidence de la législation n'est pas ressentie car les intéressés son trop éloignés des centres urbains pour être soumis à des contrôles stric et nombreux et les principes coutumiers du droit des eaux continuent à y être observés.

3.3.- Servitudes :

Les riverains des cours d'eau, lacs et sebkhas déterminés par décret sont astreints à une servitude de passage sur une zône large de mètres à partir de la rive (servitude de franc bord). Cette servitude ne donne pas droit à indemnité, et dans cette zône, toute construction,

... la clôture fixe ainsi que toute plantation est soumise à une autorisation préalable du Ministère de l'Agriculture. Des "zônes d'emprise" nécessaires à l'exploitation et à l'entretien des conduites d'adduction ou aqueducs peuvent aussi être déterminés par le Ministre de l'Agriculture (section 40 - 44).

De plus, les riverains des canaux d'irrigation, ou d'assainissement déclarés d'utilité publique par l'administration sont tenus de permettre le libre passage et l'emploi sur leurs propriétés des engins mécaniques servant aux opérations d'entretien, dans la limite d'une largeur de 4 mètres à partir de la rive du canal d'assainissement ou d'irrigation. Ils doivent également permettre de dépôts de produits de curage sur ces zônes, de servitude qui en ce cas peuvent atteindre le double de la largeur ; l'expropriation des terrains privés de la servitude de dépôt devient obligatoire à défaut de vente à l'amiable (art. 50).

En outre, tous terrains, bâtiments, ou autres biens immobiliers de propriété privée sont soumis à de nombreuses servitudes concernants, entre autres, le passage des personnes, des collecteurs d'eau, des installations d'égoût et de drainage, de même, que toutes autres servitudes qui peuvent être nécessaires pour des raisons d'hygiène, d'utilité publique ... Les contestations relatives aux montants des éventuelles indemnités sont tranchées par les tribunaux.

3.- Conséquences du régime domanial :

Le régime domanial de toutes les ressources en eau existant en Algérie comporte plusieurs conséquences :

- l'administration publique a le droit d'intervenir dans tous les secteurs relatifs à la gestion des eaux dans son sens le plus étendu : inventaire, utilisation, conservation ; et celà du point de vue quantitatif, qualitatif, et à tous les niveaux (national, régional et rural). Il ne doit pas y avoir des contraintes purement juridiques qui empêcheraient ces interventions.

- L'usage des eaux est protégé au titre de la réglementation des eaux (régime de l'autorisation) et à celui de l'occupation du domaine public (régime de l'occupation du sol ;

- l'accès à l'eau est garanti au profit de l'Etat, par différentes dispositions. Celles-ci, soit lui attribuent la propriété d'une zône de passage déterminée, soit lui garantissent des zônes de servitudes d'emprise de dépôt).