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Abbreviations, Acronyms, and Data Notes

For the agencies that are part of a larger organization, the initials of the superior organization appear in parentheses following the entry.

ACI	Association with collective interest (see also GCI, ADA)
ADA	Agriculture Development Association (agriculture, fisheries)
CEA	Country environmental analysis
D/IE	Directorate of Industrial Environment (MAEHR)
D/LF	Directorate of Local Finances (MILD)
D/RNEC	Directorate of Rural and Natural Environment Conservation (MAEHR)
D/UE	Directorate of Urban Environment (MAEHR)
DG/WR	General Directorate of Water Resources (MAEHR)
DW	Drinking water
EIB	European Investment Bank
EMFP	Environmental Management Fund for Packaging
FOCRED	Pollution Reduction Credit Fund
FODEP	Depollution Abatement Fund (MAEHR)
GCI	Group with collective interest (formerly ACI)
GD/APQCP	General Directorate of Agricultural Product Quality Control and Protection
GD/DCAL	General Directorate of Development and Conservation of Agricultural Lands (MAEHR)
GD/DMHW	General Directorate of Dams and Major Hydraulic Works (MAEHR)
GD/ELQ	General Directorate of Environment and Quality of Life (MAEHR)
GD/F	General Directorate of Forestry (MAEHR)
GD/FA	General Directorate of Fisheries and Aquaculture (MAEHR)
GD/LUP	General Directorate of Land Use Planning (MEHLUP)
GD/PLA	General Directorate of Public Local Authorities (MILD)
GD/REWE	General Directorate of Rural Engineering and Water Exploitation (MAEHR)
GDP	Gross domestic product
GEF	Global Environment Facility
GIS	Geographic information system
GNP	Gross national product
GoT	Government of Tunisia
GTZ	Deutsche Gesellschaft für technische Zusammenarbeit
ICETT	International Center for Environmental Technologies of Tunis (MAEHR)
IRD	Integrated rural development program
KfW	Kreditanstalt für Wiederaufbau

MAEHR	Ministry of Agriculture, Environment and Hydraulic Resources
MCTT	Ministry of Communications Technology and Transport
MDG	Millennium Development Goal
MDIC	Ministry of Development and International Cooperation
MEHLUP	Ministry of Equipment, Housing and Land Use Planning
MENA	Middle East and North Africa Region
METAP	Mediterranean Environmental Technical Assistance Program
MIE	Ministry of Industry and Energy
MILD	Ministry of Interior and Local Development
MIP	Municipal investment plan
MPH	Ministry of Public Health
MTCH	Ministry of Tourism, Commerce and Handicraft
NACP	National Agency for Coastal Protection and Management (MEHLUP)
NAS	National Authority for Sanitation
NEPA	National Environment Protection Agency (MAEHR)
NGO	Non governmental organization
NREA	National Renewable Energy Agency
NSDC	National Sustainable Development Commission
NSF	National Solidarity Fund (also called Fund 26-26)
NWSP	National Water Savings Program
OECD	Organization for Economic Co-operation and Development
PPP	Polluter-pays principle
SEA	Strategic Environmental Assessment
SMAP	Short- and medium-term priority environmental action program
SONEDE	Tunisian Company for Potable Water.
STEG	Tunisian Company for Electricity and Gas
SWC	Soil and water conservation
SWMNP	Solid Waste Management National Program
TALT	Tunisian Agency for Land Transportation (MCTT)
TCEA	Tunisia Country Environmental Analysis
TOESD	Tunisian Observatory for the Environment and Sustainable Development
TZEPF	Tourist Zone Environmental Protection Fund
UNFCCC	United Nations Framework Convention on Climate Change
WSIP	Water Sector Investments Program
WTO	World Trade Organization

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Executive Summary

General Context of the Country Environmental Analysis

1. Since gaining independence 40 years ago, Tunisia has achieved considerable economic and social progress. Its early emphasis on job creation and development of human capital, followed up by sustained institutional and economic reforms, has put the country on the path of sustainable development.
2. This progress has been coupled with undeniable success in environmental policies, initiated by the development in 1990 of a national environmental action plan (NEAP). A legal and institutional framework was established for the NEAP, and important environmental and natural resource conservation programs were financed under it. The creation in 1993 of the National Sustainable Development Commission (NSDP) confirmed Tunisia's commitment to sustainability principles and its recognition that, in the long run, sustainability will require, more than ever the integration of environmental issues into social and economic development policies.
3. Ten years later, in pursuance of commitments made at the second Earth Summit, held in Johannesburg in September 2002, the Government decided to conduct a study, with World Bank assistance, to assess the progress achieved thus far and identify the required conditions for a greater and deeper integration of environmental sustainability into social and economic policy. The report "Tunisia Country Environmental Analysis" (TCEA) is an outcome of the study.
4. The main objectives of the CEA are (a) to facilitate the integration of environmental issues into sectoral development strategies, which could affect the sustainability of development in particular with respect to economic growth, poverty reduction, and quality of life, and (b) to improve, adapt, and strengthen institutional capacity and decision-making processes in line within this integration requirement and the international economic context.

A very impressive record that needs to be perfected

5. A detailed analysis of the achievements of the past 10 years shows that, thanks to a deliberate strategy of deregulation, modernization, and integration of its economy into the global economy, Tunisia has made significant progress toward reaching most of the eight internationally agreed Millennium Development Goals (MDGs).
6. For example, over the period studied, poverty fell from 10 percent in 1990 to 7 percent in 1995 and to 4.1 percent in 2000. Primary education is accessible to all, and the enrollment ratio exceeds 98 percent. Women are guaranteed gender equality, access to work, and equal levels of remuneration. Child mortality is declining and is estimated at 25.8 deaths per 1,000 live births. Maternal health is improving; the maternal mortality ratio does not exceed 70 deaths per 100,000 births (1995). The fight against HIV/AIDS and other epidemic and endemic diseases is regarded as progressing satisfactorily, and the goal of a global partnership for development is at the core of Tunisian policy.
7. Economic and social progress has provided favorable conditions for environmental sustainability. The first target of MDG7, on environmental sustainability, calls for, inter alia, the integration of the principles of sustainable development into country policies and programs and reversing the loss of environmental degradation.

Three outcome and progress indicators, which despite being incomplete and could be improved, made it possible to assess the trends and environmental progress for this study:

- The *cost of environmental degradation* is estimated at 522 million Tunisian dinars, or 2.1 percent of gross domestic product (GDP)—the lowest rate among the Mashreq and Maghreb countries.

- *Adjusted Net Savings* (ANS) rose from 2.6 percent of GDP in 1980 to 19 percent in 1999, with a prevalence of around 15 percent and steady growth between 1993 and 1999.
- In the *Environmental Sustainability Index*, Tunisia ranks 61st among 142 countries rated. Its ranking places it in the middle of the countries of the Mediterranean Basin and first in the group of southern Mediterranean countries.

Main conclusions of the CEA

9. While acknowledging the progress that has been achieved, it is important to consider whether Tunisia has definitively completed its environmental transition and is ready for complete integration of its economy into the global economy. Within this context, the diagnosis and analyses detailed in this report lead to four general conclusions, which form the basis for the study recommendations.

10. *Institutional and political development.* The institutional and political framework developed by the Government of Tunisia enabled it to satisfy the satisfaction, in major parts, the open door economic and adjustment policy and the increase in the standard of living of the Tunisian population. Under a central planning administration, well financed, and politically strong administrations, significant progress was made. This progress was characterized by (a) mobilization of almost all the country's water resources (4.6 billion cubic meters) through an integrated water infrastructure that started to take into consideration ecological needs; (b) an increase in the irrigated area to 380,000 hectares and savings in irrigation water per plot that in 2001 affected 67 percent of the surface area; (c) the expansion of access to drinking water to cover 98 percent of the urban population and 82 percent of the rural population; (d) the extension of sanitation services to 71 percent of the urban population; (e) an estimated municipal collection coverage rate of 95 percent in urban areas and 90 percent in rural areas; (f) a 30 percent improvement in energy intensity; and (g) the development of financial incentive and sectoral subsidy instruments for industrial pollution control, environmental protection of tourist areas, the national program for irrigation water savings, and subsidies for soil and water conservation and for energy saving.

11. *Management of natural resources.* The intensive use of natural resources (in particular, water, soil, and coastal resources) is the weak link in the sustainable development chain. Tunisia is among the 17 countries that would experience absolute scarcity of water resources by 2005. The most important consequence is that the country, which is also very vulnerable to climate change, will not have enough water to maintain the current level of irrigated agricultural production per capita while meeting demands for drinking and industrial water and ecosystem needs. Also of concern is the degradation of 3 million hectares of soil as a result of agricultural development policies that focused on achieving food security objectives through (a) selection of cultivation methods and agricultural products (such as cereals) that may be appropriate for the local market but may also cause soil and water degradation and (b) direct subsidies and price supports that do not take into consideration the negative effects on natural resources, which are still unknown. Finally, the social and environmental aspects of development of coastal zones require particular attention. The Tunisian coastline is home to more than 65 percent of the Tunisian population and is a home for heavy and polluting industries, though it represents a major source of revenue, attracting more than 5 million tourists per year - a number that is regularly increasing. The effects of tourism development on the demographic and urban development of the coastline (which may be aggravated when added to the impacts of industrial, transport, and other projects) are not well known or are simply observed and mitigated after the fact. Some indirect impacts, mainly related to waste management, have potential negative effects on the coastal environment.

12. *Public expenditure efficiency.* During the period 1990–2000, 2.1 billion dinars, or 1.03 percent of Tunisia’s GDP, were spent on environmental and natural resource management. This percentage shows the considerable attention to the environment by public authorities and is at the same level as in some European countries. The significant budget allocation is one of the main reasons that the country was able to maintain environmental degradation costs to only 2.1 percent of GDP. However, over the past decade, State subsidies have reached 288.7 million dinars with an average increase of 35% per year (in constant dinars), showing that the private sector has little contributed to the costs that it generates. The subsidies have not yet triggered a change in the behavior of the beneficiaries, in particular regarding the management of natural resources; for example, farmers’ economic behavior is guided by State rules on production prices, which do not favor optimal utilization. In the short and middle terms, the subsidies should be restricted to public goods and should be limited in volume and time. In the long term, the subsidies risk diverting budget resources from other priority programs. Tunisia should proceed with the strict implementation of the polluter-pays principle, which would favor public expenditure efficiency, recovery of the costs of services and resource utilization, and the integration of environmental degradation costs and would also influence production and consumption habits.

13. *Coordination and integration of sectoral policies.* Most of the country’s (explicitly and implicitly directly and indirectly) environmental policies remain sectoral and independent from one another. Qualitative and quantitative assessments of impacts on the environment and natural resources are generally well documented on a technical level, except for water and soil, which requires additional information or forecasts. But “softer” (social and economic) fields such as the identification of financial instruments, capacity for analysis (perspective, cost-benefit, social and environmental strategic studies, etc.), and public participation in the development, implementation, and monitoring of sectoral policies are weak. This “two-speed” progress is a good indicator of what still needs to be done to reach sustainable development goals in Tunisia. The institutional and political framework should be modified so that it can adapt rapidly to the needs of a new period characterized by (a) a competitive job-generating economy in which the private sector plays a principal role; (b) the use of economic instruments as incentives; (c) better integration of economic growth objectives into environmentally sustainable management and, in parallel, better cross-sectoral coordination; and (d) an increased role for municipalities, other local organizations, and civil society in the management of environmental problems, each at the appropriate scale.

Priority objectives emerging from the CEA

14. Overall, the conclusions outlined above show that despite considerable effort, the negative ecological effects of the intensive use of natural resources (namely water, soil, and coastal zones) still remain the most important problem in Tunisia. This situation has been, and will be in the future, closely linked to the country’s economic and social development. Solutions aimed at mitigating constraints and limitations should therefore be anchored into the economic, institutional, and social reforms proposed by Tunisia as part of the sustainable development policy it committed to implement in Johannesburg.

15. The proposed approach for addressing these new priorities is essentially based on institutional and supporting measures, including the formulation of new policies for the adoption of existing tariffs (on irrigation water, for instance), and the development of economic instruments for environmental management, such as environmental taxation, and of supporting measures such as information systems and strategic environmental assessments. (See table 1 at the end of this summary for details.

16. *Integrated conservation of soil and water and improvement of their productivity.* The soil and water policy is characterized by (a) the integration of soil and water conservation concerns into rural and agricultural development strategies; (b) the development of a predictive assessment of subsidies granted to water conservation and of the possible negative impacts (e.g., salinity) on the productivity and quality of irrigated products; (c) assessment of the impacts of future changes in protection and subsidy regimes on trade in agricultural products and on the changes induced in soil cultivation; (d) assessment of the impacts of climate change and the adaptation policies to be developed; (e) the development of systems for the measurement and interpretation of soil evolution and for water quality measurement and monitoring; and (f) encouragement of the effective participation of farmers' groups in the development choices of their activities.

17. *Improvement of the quality of economic growth on the Tunisian coastline.* To improve the quality of economic growth in coastal areas, it will be important to (a) ensure balance between increased tourism and preservation of the quality of the coast and (b) improve tourism benefits by ensuring to targeted clients a quality environment that meets their expectations. Another consideration is that the quantity of municipal waste is expected to increase during the coming years as a result of population and consumption growth, affecting coastal quality. Accordingly, additional recommendations are to (c) clarify the roles of public authorities and the costs of integrated waste management; (d) set efficient market rules in order to guide and develop integrated management through the means that may be offered by the private sector; and (e) develop inter-communality and raise the awareness of citizens and industry as to the financial implications of their behavior.

Proposed reforms and options for sustainable environmental management

18. The attainment of environmental sustainability requires environmental policy reform, institutional and legal adjustments, and new analytical tools of strategic planning, as described in detail in table 1.

19. *Policy reform.* The focus of policy reform should be on (a) progressive reorientation of the intensive exploitation of natural resources on the basis of criteria of economic performance, degradation, and resource scarcity; (b) the adoption of a tariff policy for water, energy, and municipal services that enables the recovery of long-term investments, maintenance, and depreciation costs—in particular for water resources intended for agriculture, which are still priced at a low percentage of total mobilization cost; (c) the adoption of a policy aimed at rapid transfer of water resource management to irrigators and, beyond the binomial tariff system, the introduction of market mechanisms in water resource management; and (d) the adoption of a cost recovery policy for solid waste, starting with the implementation of landfill tariffs in Greater Tunis (5.15 dinars per ton) and subsequently passing the entire operating cost (9.0 dinars per ton) on to municipalities and citizens, with the long term goal of recovering the total costs, from collection to disposal, which are estimated at 55 dinars per ton.

20. *Institutional reform.* The implementation of cross-sectoral strategies and policies requires adjustment of a number of environmental institutions, mainly the ANPE, NAS, NACPM, NREA and ICETT, and the development of a horizontal action dimension for a comprehensive and integrated perspective on sustainable development and environment.

21. The National Environment Protection Agency (NEPA), as a national regulatory agency, should mainly focus on the understanding and the assessment of the environment and the impacts of degradation on health and natural capital; preventing environmental damage by improving the

environmental impact assessment (EIA) system at the levels of strategies, programs, and projects; implementing integrated pollution control and the prevention and monitoring of all types of pollution (air, water, and solid waste); and progressively applying the polluter-pays principle.

22. NEPA and the National Authority for Sanitation (NAS) should be relieved from their dual functions of being judge and party, in particular in the management of municipal waste and, for NAS, in the control of water pollution. NEPA's waste management department should retain its public service functions, including regulation, development and monitoring of policies and programs, and information on and dissemination of integrated waste management techniques.

23. It will be important to take advantage of the changes in ministerial affiliation of environmental agencies. For example, under the supervision of the Ministry of Agriculture, Environment and Hydraulic Resources (MAEHR), the role of the National Agency for Coastal Protection and Management (NACPM) as regulator of coastal development could be enhanced so as to integrate the environmental dimension into tourism and town planning policies. Similarly, the National Renewable Energies Agency (NREA), in the context of air pollution control, could establish close links between environment and energy, thus affecting energy policies.

24. Finally, the International Center for Environmental Technologies of Tunis (ICETT), as a regional training center for environmental technologies, should adapt its training programs on integrated water and soil management, waste technologies, and water quality. It should acquire new training capacities in environmental economics and strategic environmental study methodologies so that it can train competent executive staff in these fields.

25. The refocusing and adjustment of the environmental agencies' functions are not by themselves enough to ensure cross-sectorality and cooperation between ministries and beneficiaries. A horizontal system should be developed for a comprehensive and integrated perspective on sustainable development and environment. It is strongly recommended that the actions of existing commissions, councils, and committees be supported by a permanent structure responsible for sustainable development monitoring and policies within the MAEHR, under the direction of the state secretary for environment and with an autonomous budget.

26. This structure, which may be either new or integrated with one of the existing institutions, can (a) serve as a permanent coordination mechanism for all sectors and partners concerned with sustainable development in Tunisia, (b) define and validate continuous cooperation and exchange protocols with external information sources; (c) extend its activities to encompass the conduct or steering of scientific and economic strategic studies on cross-sectoral themes, and (d) develop expertise on environment policy, assessment of benefits and damages, and environmental economics.

27. The integration of environmental policies into sectoral development strategies and Tunisia's opening toward globalization, in particular within the scope of its Association Agreement with the European Union (EU), require a modification of the environmental legal framework. Law 91, on environmental protection (1988, amended in 1992 by law 125), should be revised to better reconcile environment with sustainable development. It should incorporate the preventive action, precautionary, and polluter-pays principles; integrated pollution control; and self-monitoring and self-control principles and should provide general directions favoring information and public participation.

28. Decree 91-362, on environmental impact assessment (EIA), also needs to be revised to promote integrated protection of the environment. For project EIAs, the procedure should include public consultations, from project identification and siting to the finalization of the EIA report.

Access to the reports should be free, and the reports should be put at the disposal of nongovernmental organizations (NGOs) and concerned persons or persons who might bring inputs to the project. Strategic environmental assessment (SEA), which focuses on sectoral and regional aspects and on economic policies, should be used in a more systematic way as an analytical tool for addressing complex environmental problems, as well as for the integration of environmental considerations upstream into the decision-making process and sectoral planning. To ensure the integration of environment into sectoral and cross-sectoral policies that are deemed priorities, five main SEAs will be necessary: on the mobilization and allocation of water resources, agricultural development and water conservation, agricultural development and soil conservation, tourism development, and environment and trade.

29. In addition to the SEAs, strategic planning should be based on a concrete and in-depth diagnosis of the causes and impacts of sustainable development dimensions, in particular on the relationships between environment and poverty and the links between environment and economic growth. Tools should be developed to quantify environmental externalities (for example, effects on health or natural capital) and to assess these costs and benefits and their impacts on sectoral policies. Two tools are proposed: (a) cost assessment of environmental degradation in various environmental themes and (b) adjusted net savings, which takes into account loss of wealth, such as fish, groundwater, and soil resources. The implementation of these tools will require changes in the level of expertise of the personnel and a progressive modification of environmental agencies' skills.

The World Bank's role

30. The overall analysis of progress in environmental and natural resource management has revealed that the main gaps are in the "soft," less technical, economic and social fields. The World Bank will accordingly be able to build on the assistance already extended to Tunisia to promote sustainable development goals through transfer of knowledge and with the assistance of other partners, instead of only financing environmental projects. World Bank interventions in the environmental field will be guided mainly by the principle of exchange and transfer of knowledge, on the basis of the Bank's global experience.

31. *Strategic collaboration.* The Bank's MENA Region, which is responsible for the definition, implementation, and monitoring of the collaboration program between Tunisia and the World Bank, will focus on five areas in which the Bank has a comparative advantage: (a) use of economic criteria and assessment of externalities; (b) links between international trade and environment; (c) identification and development of sustainable development indicators; (d) monitoring of MDG 7; and (e) improvement of environmental management, in particular regarding strategic environmental assessment methodology.

32. The MENA Region will need to determine to what extent its intervention will contribute to a significant improvement of policy effectiveness regarding improvements in governance of its environmental institutions; the development of the private sector and its corporate environmental responsibilities and its global competitive capacity; and improvements in soil and water management, which will be based on the outcomes expected from the sub-goals outlined in chapter 6 of this report.

33. *Sectoral integration and coordination with development partners.* The MENA Region will continue to strengthen its collaboration within the World Bank Group and with financial partners for the implementation of the recommendations made in this report. In particular, it will ensure that the relevant Bank departments are involved in the development and monitoring of the

proposed environmental activities. Outside the Bank, the MENA Region will continue its close collaboration with the five partners in the Mediterranean Environmental Technical Assistance Program (METAP)—the European Commission, the European Investment Bank, the United Nations Development Program, and the governments of Finland and Switzerland) to promote a regional technical assistance program for water quality and coastal zone management, municipal waste management, and the development of environmental policy tools, such as environmental safeguards, and of links between trade and environment and between finance and environment. The MENA Region should also strengthen its coordination with other financial institutions that are active in the environmental field, such as the European Commission and the German cooperation agencies—the Deutsche Gesellschaft für technische Zusammenarbeit (GTZ) and the Kreditanstalt für Wiederaufbau (KfW). Through its regional projects financed by METAP, it will ensure that NGOs and the media participate in the consultative meetings and the training sessions and workshops.

34. *Short-term collaboration program.* Environmental sustainability is one of the five MDGs to which the World Bank Group has decided to align its portfolio. The MENA Region will accordingly continue its consultations with its Tunisian partners to assist them in implementing the CEA recommendations through a regular dialogue with the goal of initiating and monitoring an annual action plan jointly decided with the MAEHR.

35. During fiscal 2004 and 2005, the MENA Region will offer its assistance to Tunisia in six fields: (a) integrating selected priority recommendations of this CEA into the Bank's country assistance strategy; (CAS); (b) raising awareness on the part of concerned parties in Tunisia and preparing an action plan for implementation of the recommendations as of fiscal 2005; (c) improving the performance of the Bank's project portfolio, especially its environmental components, through the consolidation and implementation of social and environmental safeguard policies; (d) initiating the preparation of the natural resource management project and finalizing the preparation of the project for protection of marine resources in the Gulf of Gabes; (e) initiating a pilot project for the harmonization of the EIA system with the World Bank's system; and (f) continuing METAP technical assistance activities.

Conclusion

36. This CEA is the first experience in the MENA Region for putting in place a diagnostic and analytical tool for integrating environmental considerations into development policies in a limited number of priority fields, while taking into account the socio-economic situation and country management and execution capacities. Environmental sustainability requires an integrated, long-term gradual approach. The most important outcomes of such an approach will only be seen in the middle and long terms, and World Bank assistance and collaboration should not be justified on the basis of short-term results and benefits alone. Thus, the strategic activity does not end with the publication of this document. Continuous collaboration and a permanent dialogue are necessary and should involve all of Tunisia's development partners. The implementation of the proposed reforms and the development of a system for assessing their results and impacts should be developed in the first place by Tunisia. The Bank should be ready to accompany Tunisia throughout this process.

Table 1 Priority goals and recommendations of the study

Field	Main goal	Sub-goal	Expected outcome	Means and measures
Integrated soil and water management				
Soil and water	Integrated conservation of the quality and productivity of natural resources (soil and water)	Integrate soil and water conservation (SWC) concerns into development strategies in a sustainable development perspective, while taking into account the country's biological diversity	Long-term equilibrium between the priorities of water-consuming agricultural development and soil resources Economic optimization of land productivity	Strategic environmental assessments (SEAs) of agricultural development, including farmers' financial revenues, national economic interests, and resource consumption SEA of the impacts of climate change and adaptation policies and their impact on the management of natural resources
		Assess the impact of implementations in terms of SWC for large-scale interventions and for smaller interventions at the farm level; promote the adoption of anti-erosion techniques through the strengthening of awareness and extension actions; further encourage an integrated and territorial approach	Re-adjustment of investment programs and levels regarding SWC. Adaptation of anti-erosion techniques for effective use by small farmers	Assessment study of the technical, economic and social aspects of SWC programs
		Conduct a study on the impact of subsidies on water conservation and possible impacts on the soil and the profitability and quality (value added and export potential) of irrigated products	Determine projections of speculative real margins according to area (land capability maps, detailed soil maps) integrating the value added for production and consumption (quantity and quality) of water and soil resources	Economic study on the integration of the current and future indirect costs of water savings
		Assess the impacts of future changes in price and subsidy policy on changes in soil use and diversification of cultivation	Determination of the production types and farm types that should be subject to conversion to other products with the help of targeted subsidies	Regular update of comparative advantage according to market development while integrating product quality concepts

Field	Main goal	Sub-goal	Expected outcome	Means and measures
			Changes induced in soil cultivation use to maintain the quality required by potential clients	Product diversification and quality studies
		Develop mechanisms for observation and permanent monitoring and surveillance of environments and natural resources (for instance, a water and soil observatory)	Development of networks for measuring water and soil status (already begun under the Water Sector Investments Program, WSIP) as a basis for the scientific interpretation of simulated future changes	Simulations of profitability progress (quantity and quality) and resource degradation according to valuation
			Information and data on the water and soil nature and quality, as well as constraints and incentives, to be put at the disposal of all users	Dissemination of agricultural maps and other information; establishment of a consulting service
		Encourage the effective participation of farmers' groups in orientations and choices concerning the development of their activities; create conditions for better involvement of users in the management of their resources	Definition and approval by farmers' groups of development projects that are satisfactory for their revenues and preservation of resources, with possible compensation for temporary loss of profit	Awareness raising actions within agricultural development institutions

Field	Main goal	Sub-goal	Expected outcome	Means and measures
Tourism and coastal protection				
Coast	Improve the quality of coastal economic growth	Ensure equilibrium between increased tourism and preservation of coastal quality	Development of maximum absorptive capacities (tolerance thresholds) of tourist activities while taking into account other constraints and projects through strategic environmental assessment (SEA)	Strategic environmental assessment of tourism for four regions: Gulf of Gabes and southern coast; Sahel and Gulf of Hammamet; Greater Tunis and neighboring coast; northern coast
		Improve tourism profits by ensuring to targeted clients a quality environment and ecology-based tourist products meeting their expectations	Determination of economic optimums, including the value added expected from better quality of the general environment	Surveys on willingness to pay of current and future clients
		Develop institutional and regulatory tools for integrated management of coastal areas	Integration of tourism planning into spatial development planning and coastal cities planning	Revision of regional schemes for tourism development

Field	Main goal	Sub-goal	Expected outcome	Means and measures
Solid waste management (municipal, industrial, and other waste)				
	Adopt financially and technically integrated waste management	Clarification of the roles of public authorities and of financial costs for integrated management of municipal and other waste	Determine appropriate groups of municipalities for optimal organization of collection	<i>Measure already integrated into the waste management program</i>
		Formulation of efficient market rules and technical development through the private sector	Provide guarantees to private sector contracts based on the solvency of municipalities and develop a regulation system for contracts awarded by competitive bidding	Study of a design-build-operate system as a preferred form of public-private partnership for integrated waste management
		Development of inter-communality; awareness raising for citizens and industry as to the financial implications of their behavior	Introduction of cost accounting in the municipalities	<i>Measure already integrated into the municipalities upgrading plan</i>

Field	Main goal	Sub-goal	Expected outcome	Means and measures
			Definition of a pricing system based on total cost and willingness to pay of users (households and companies)	Raising through awareness campaigns the responsibilities of the citizens in solid waste management

Field	Main goal	Sub-goal	Expected outcome	Means and measures
Institutional and policy reform				
	Adapt economic policies to sustainable development	Adapt development sectoral policies, pricing, and cost recovery systems	Gradual revision of the natural resource overuse policy	Promotion of the transfer and development of unconventional technologies and resources in designated priority fields
			Development of a pricing policy (for water, energy, municipal services, etc.) enabling the long-term recovery of investment, maintenance, and depreciation costs	
			Adoption of a policy for the acceleration of transfers to irrigators and the introduction of market mechanisms for water resource management	Revision of laws and regulations
			Gradual recovery of the costs of municipal and industrial waste collection and treatment	
			Promotion of appropriate incentive and financing mechanisms	Adjustment for changes in the five-year development plans
	Adapt environmental institutions and regulations	Clarify and refocus the missions of environmental services and agencies to strengthen their performance	Release the NEPA from tasks that do not lie within the scope of its main mission of pollution controller and regulator	Revision of laws and regulations

Field	Main goal	Sub-goal	Expected outcome	Means and measures
			Gradual transfer of integrated waste management (to local authorities or syndicates or without concessional agreements)	
			Refocusing of NACPM activity, in close coordination with the GDLUP, on its role of regulator and protector of the coastal zones	
			Strengthening of ICETT's training on environmental impact assessments (EIAs), SEAs, and environmental economics	
			Strengthening of TOESD's capacity in geographic information systems (GIS) and impact modeling and analysis	
			Strengthening of the role and capacities of the environmental administration at the national, regional, and local levels to promote new approaches and tools in priority environmental fields	
	Integrate environmental concerns into other sectors	Develop horizontal collaboration between environmental agencies and other concerned authorities	Development of a coordination, exchange, and analysis structure in support of NSDC decisions	
		Develop specific decision-making support tools	Adoption by Tunisia of economic and physical simulation software	Recruitment and training (or retraining) of executive staff in environmental economics
		Integrate trade development into environmental policies	Assessment of the impacts of external environmental standards on the trade system (imports and exports)	

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1. Introduction

1.1 General Context

1. Since its independence, Tunisia's progress has been impressive in more than one respect. With limited natural capital and an originally rural society, the country invested at an early stage in human and social capital, and carried out institutional and economic reforms that led to its being on a sustainable development path 40 years later.¹ Also at a very early stage, attention and efforts were focused on the management of environmental resources as a fundamental element of the country's economic and social policies. There have been two main development phases.

2. The first phase, from independence until the mid-1980s, was a phase of exploitation of Tunisia's natural resources in order to develop social and human capital. Water, land, energy and coastal resources were used to develop the education and health sectors, create new job opportunities, and increase people's income, especially that of the rural population. Significant progress was made, in particular, in improving people's quality of life. But new problems emerged, linked to accelerated urbanization, industrial development, and the intensified exploitation of natural resources.

3. In the second phase (corresponding to the start of the macroeconomic structural adjustment and present stabilization programs), socio-economic gains were consolidated and strengthened, and environmental sustainability was integrated into economic development goals. In addition to the diversification of the economy, annual per capita income doubled and considerable progress was made in improving the productivity of the agricultural sector, developing tourism and services, and increasing private sector participation in all economic fields. These positive results place the country in an advanced position compared with other southern Mediterranean countries.

4. But does this mean that Tunisia has definitely undergone an environmental transition and is ready for the complete integration of its economy into the global economy? One of the aims of this study is to provide answers to these questions.

5. Since 1988, the Tunisian government has been implementing and developing programs for preservation of the environment and conservation of natural resources. Tunisia's first attempt to formulate a policy instrument for managing the country's environmental natural resources was in

¹ Tunisia, one of the five countries of the Maghreb region, is located on the extreme northern coast of Africa and has an area of 162,100 square kilometers. Its border with Algeria extends over 1,050 kilometers, and that with Libya, over 480 kilometers. The coastline is more than 1,250 kilometers long and includes 300 kilometers on the western Mediterranean. Desert zones (regs and dunes), seas, and saline lakes account for 30 percent of the total area and urban zones and developed areas for 6 percent. The productive natural area of approximately 103,700 square kilometers is divided into forests (8 percent), tracks (46 percent), and arable land (46 percent). More than half the country has a desert, arid, or semiarid climate; only 20 percent (in the northeast and northwest) benefits from a sub-Mediterranean climate with annual rainfall ranging from 400 to 1,500 millimeters and marked annual variations and widespread droughts that may last two to four years.

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1990, when the National Environmental Action Plan (NEAP) was adopted. The NEAP included an inventory of the environmental issues, an assessment of the solutions and the degree of their urgency, and a technical and financial assessment of the suggested measures, such as studies, inventories, projects, and assistance.

6. Approximately 90 percent of the budget—an estimated 425 million Tunisian dinars, or US\$473 million in 1990—was allocated for urgent problems of urban sanitation, control of its industrial pollution, the rehabilitation of damaged environments (coastal areas and eroded cereal-growing land), and preparatory studies for the implementation of environmental improvement programs. Generally, financial resources have always been available, and it is expected that the program, in its revised form, will be implemented in the near future (see chapters 3 and 5).

7. As early as 1993, Tunisia reaffirmed its commitment to the sustainability principle with the establishment of the National Sustainable Development Commission (NSDC). The country realized that despite the undeniable environmental successes, sustainability would require, in the long run, that environmental issues be integrated more closely with social and economic development policies through a participatory approach that guarantees a positive impact on the quality of life of the country's citizens. This approach will strengthen Tunisia's adherence to the principles and objectives of sustainable development.

8. The proposals and guidelines contained in Tunisia's report submitted for the second Earth Summit in Johannesburg in 2002 conform to the summit's resolutions as embodied, in particular, in the UN Millennium Development Goals (MDGs).

9. It is within this framework that the Tunisian Government agreed to conduct with the World Bank an analysis of its environmental performance, to direct its efforts to a broader, more comprehensive sustainable development policy based on its commitments at Johannesburg. This analysis comes at a time when the World Bank, in the context of the preparation of its cooperation strategy with Tunisia for the period 2004–7 and of its Environment Strategy (World Bank 2002), "Making Sustainable Commitments," has undertaken to collaborate in integrating environment into strategies, programs, and sectoral projects and into the economic policy dialogue.

10. A systematic approach is therefore necessary to introduce environmental concerns upstream in the development planning processes by adopting a multi-sectoral, participatory vision that focuses on the anticipated outcomes of environmental sustainability.

11. This systematic approach is evidenced in this paper, "Tunisia: Country Environmental Analysis" (CEA). The analysis is based on the NEAP, on other sectoral national strategies, and on analyses undertaken by the World Bank and other financial institutions. As a diagnostic tool, it will allow Tunisia to provide a new tool for addressing environmental policies and will provide guidelines and means for assessing the integration of environment into sectoral policies and for measuring and following up integration. It will also allow the World Bank to engage in dialogue on its collaborative program in the sustainable environment field and will contribute to the formulation of the Bank's cooperation strategy with Tunisia.

12. It should be noted that this study, unlike the NEAP, addresses only a limited number of sectors considered to be priorities according to economic criteria such as cost assessments of environmental degradation and effects on adjusted net savings. Consequently, some environmental themes and activities, such as conservation of biodiversity, are not assessed in detail in this document. This does not mean, however, that they are neglected in World Bank assistance programs, as the project for management of the Gulf of Gabes illustrates.

1.2 Study objectives and methodology

13. The two main objectives of this CEA are:

- To facilitate the integration of environmental issues into the economic development strategies of sectors that affect the sustainability of development, in particular with respect to economic growth, poverty reduction, and quality of life
- To improve and build institutional capacity and decision-making processes for achieving environmental mainstreaming.

14. The analysis is based on a retrospective assessment of achievements during the periods 1992–96 and 1997–2001; corresponding to the Eighth and Ninth Socio-Economic Development Plans. The main questions it addresses are these:

- Given the expected international developments, will the current strategies and policies for environmental protection and natural resource conservation remain effective, or will they have to be adjusted or revised?
- How can current and planned programs and projects be efficiently integrated into the new strategies in the short term? Will they have to be revised in the middle and long terms, and how?
- Can the institutions in charge of the environment and natural resource management, within the scope of their missions and means, adequately manage the foreseeable changes? If not, how can their capacities and their efficiency be increased?

15. The study took into consideration the studies and assessment results from World Bank interventions and assistance, as well as strategy documents and appraisal reports issued by the Tunisian authorities. The latter include:

- The annual state of the environment report
- The National Environmental Action Plan and its revisions, as well as sectoral strategies for water management, water and soil conservation, and reforestation
- Strategies for drinking water supply and sanitation
- The National Solid Waste Management Program and interventions by the Packaging Environmental Management Fund (ECOLEF), established in 1999
- Funds for pollution abatement and control

16. The study also takes into consideration the results of the World Bank's country assistance strategy for Tunisia for fiscal 2000-2002, a study of environmental degradation costs as a preliminary index of the sectors in which degradation of the environment and resources has the strongest economic and social impact; and the results of the "Trade, Environment and Competitiveness" reports. The draft working papers of the six ad hoc committees established by the Ministry of the Environment for the forthcoming meeting of the National Sustainable Development Commission (NSDC) were also used (The six committees deal with the sustainability of forests, agriculture, fishing and aquaculture, industry, cities, and tourism.).

17. To update and enrich these basic documents, meetings were held with the officials in charge of environmental institutions and other concerned government departments, enabling the drafting of specific documents for 12 sectors² of major interest for environmental conservation and natural resource management.

² The twelve sectors are forests and tracks, water and soil conservation, management of irrigation water, drinking water in urban areas, drinking water in rural areas, energy resources, air pollution, water pollution and sanitation, management of solid waste, land management, coastal management and tourism, and fishery resources.

1.3 Outline of the report

18. The report addresses the following issues:

- Past performance and future challenges in the social, economic, and environmental aspects of development (chapter 2)
- Progress and remaining problems (chapter 3)
- Environmental policies and institutions and the roles of national and local authorities and of civil society (chapter 4)
- The efficiency of public expenditures for environment and natural resources (chapter 5)
- Future environmental goals and priorities in the fields where fundamental problems remain; the priority action options to be implemented, identifying, for each priority field, the instruments that can and must be implemented prior to elaboration of the new recommended environmental policies, with proposals for World Bank assistance (chapter 6).

19. This study is the first think piece in the Middle East and North Africa (MENA) region on the mainstreaming of the environment into general development policies in selected priority fields while taking into account socio-economic realities and the countries' management and implementation capacities. The process requires a progressive and iterative approach, which necessitates prioritizing the measures to be taken. The strategic action is thus not limited to the publication of this report. Continuous collaboration and continued dialogue are essential to the upgrading, systematic improvement, and implementation of the options proposed in this analysis.

2. Recent Performance

2.1 Remarkable economic and social progress

20. Generally, since the mid-1980s, Tunisia has followed a deliberate strategy of deregulation, modernization, and integration of its economy into the global economy, through a series of macroeconomic programs of structural adjustment and stabilization. The results are impressive. Per capita income growth rose from 2 percent in the 1980s to 5 percent in 2000 (figure 2.1), which is considered one of the success stories in the region, and the economy improved sufficiently to allow diversified economic growth and the alleviation of volatility, in particular in the tourism and agricultural sectors. Poverty fell significantly, from 40 percent in 1960 to less than 5 percent in 2000, and income distribution is relatively more equitable.

Figure 2.1 Growth of gross national product (GNP) and per capita GNP, Tunisia, 1985–2000

Source: World Bank, *World Development Indicators*, various years.

21. Concerning its human and social development, Tunisia has a population of 9.78 million, which has been growing at only 1.12 percent a year, the lowest rate in Africa and one that has been in constant decline. According to the most probable forecast, the population is expected to stabilize by the end of the 2030s at a little less than 12 million. The population pyramid during the last intercensal periods has been approaching the profile of developed countries, with a clear drop in the 0–4 and 5–9 age groups and an increase in the population older than age 70.

22. Life expectancy, at 72 years, is comparable to that in developed countries. Child mortality is 29–30 per 1,000. Enrollment of both boys and girls in primary education is 99 percent. Gender parity has no equivalent in the MENA region: in law and in practice, Tunisian women have the same advantages and responsibilities as men.

23. Concerning its economic growth, the average gross domestic product (GDP) per capita reached \$2,200 in 2002, 50 percent higher than in 1990.³ The latest surveys show a rise of more than 7 percent in household budgets and consumption between 1995 and 2000, with a significant reduction of the difference between the urban population (which enjoyed a 4 percent increase)

³ Dollar amounts are current U.S. dollars unless otherwise indicated.

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and the rural population (approximately 10 percent). The service sector accounts for 59.1 percent of GDP, industry for 28.4 percent, and agriculture for 12.4 percent. Agriculture provides incomes and direct employment for 22 percent of the population. Inflation averaged 3.0 percent a year over the last decade but is now below 2 percent, which has allowed, despite the difficult recent economic situation, the continued improvement of purchasing power and domestic consumption without affecting private savings.

24. Figure 2.2 illustrates three aspects of Tunisia's performance: sustained economic growth that exceeds population growth; diversification of the structure of the economy, as shown by the decline in the share of agriculture; and increased adjusted net savings (see Kirk Hamilton, "Accounting for Sustainability," April 2003, and also the last section of this chapter for details).

Figure 2.2 Indicators of long-term trends, Tunisia, 1976–2000

Source: World Bank, Statistical Information Management and Analysis (SIMA) database.

25. By stressing the employment and rural development stakes, as well as large projects for equipment and staff training in the health and education sectors, the macroeconomic reform programs promoted the improvement of the quality of life of Tunisian citizens. In particular, considerable progress was recorded in the fields of job opportunities (more than 60 percent of job creation is in the service sector), education, health and birth control, rural migration, reduction of urban-rural income disparities, and the development of manufacturing industries, including three main branches that are increasingly oriented toward export: textiles and clothing, leather and shoes, and electromechanics and electronics. Tunisia currently has the best-qualified labor force in the area; nearly 80 percent of the population is considered middle class; and almost 80 percent of Tunisians own their family domicile.

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26. Innovative political instruments such as the National Solidarity Fund described in box 2.1 and the National Employment Fund accelerated the success of the government's two essential social objectives: to reduce disparities in living conditions and incomes between cities and rural areas, and to reduce the underemployment of young people through the creation of job opportunities and microenterprises.

Box 2.1 Tunisia's National Solidarity Fund (26-26 Funds)

From its creation in 1993 through 2000, the National Solidarity Fund (NSF, or Fund 26-26), a special Treasury fund intended to finance infrastructure and an improvement of living conditions for the population living in slum areas, fostered significant progress in rural environments where the approved ceilings of network cost for electricity and drinking water could not be met by network operators the Tunisian Company for Electricity and Gas (STEG), the Tunisian Company for Potable Water (SONEDE), and the General Directorate of Rural Engineering.

With funding from grants and contributions, the NSF was able, with 489 million dinars from its own resources and 58 million dinars from the network operators and certain government departments, to significantly improve the incomes and living conditions of 217,000 mostly rural families, living in 1,327 slum areas.

The NSF contributed to the creation of incomes and employment for 58,800 beneficiaries (44,100 in small agricultural projects, 11,000 craftsmen, and 3,700 small businesses), earmarking 63 million dinars for this purpose. Its activity as donor is supplemented by that of the Tunisian Solidarity Bank, founded in 1998, which, by granting loans without any contribution from the beneficiary and at a maximum interest rate of 5 percent a year, helped create almost 41,000 individual microprojects.

27. Such economic and social progress allowed Tunisia to negotiate in 1995, under favorable conditions, an Association Agreement with the European Union (EU) that entered into force in March 1998, opening the way for the alignment of Tunisia's economy with that of the European countries and enabling the country to prepare for a total free trade agreement with the EU in 2008. This prospect is prompting Tunisia to take up multiple challenges, including the increased improvement of companies' efficiency and competitiveness through reduction of production costs and improvement of quality and services; improved performance of human capital; and modernization and upgrading of the country's infrastructure.

28. The 1995 Association Agreement with the EU lists specific cooperation programs, in particular with respect to technical rules and standards (article 40), environment (article 48), agriculture and fishing (article 54), and energy (article 57).⁴ Article 48 states, "The aim of cooperation shall be to prevent deterioration of the environment, to improve the quality of the environment, to protect human health and to achieve rational use of natural resources for sustainable development. The Parties undertake to cooperate in areas including: (a) soil and water

⁴ Article 40 states the following: "the parties shall take appropriate steps to promote the use by Tunisia of community technical rules and European standards for industrial and agri-food products and certification procedures. Article 54 states that the cooperation is aimed at modernizing and restructuring of agriculture and fisheries; diversification of outputs and external markets; and health and plant health and growing techniques. Cooperation under article 57 is mainly geared toward renewable energy and promotion of energy savings.

quality; (b) the consequences of development, particularly industrial development (especially safety of installations and waste in particular); (c) monitoring and preventing pollution of the sea” (EC 1998).

29. In parallel, and no less remarkably, Tunisia developed an environmental policy and institutions that enabled it to address the most important problems related to degradation of natural resources, urbanization, and industrialization and at the same time to prepare the country for international environmental requirements, which are an important element in future competitiveness. Even international giants in manufacturing such as China, Taiwan, and Hong Kong (China) are lagging behind in this field and are likely to lose significant market share if they fail to upgrade the relevant policies and institutions. The next section examines this performance in terms of sustainability.

2.2 Sustainability of development

30. In this study, the sustainability of development in Tunisia is first assessed in light of the internationally adopted UN Millennium Development Goals (MDGs), which primarily target poverty reduction and progress in key aspects of human welfare. Other complementary approaches will be briefly mentioned.

Toward achieving Millennium Development Goals (MDGs)

31. By choosing at a very early stage to focus on social development and careful macroeconomic management, Tunisia has achieved remarkable progress toward the eight international Millennium Development Goals. Selected relevant indicators for which data for the past decade are available show that the country is on the right track for achieving the MDGs and approaching the performances observed in the most developed countries of the Mediterranean region. A more thorough analysis is required to be able to predict the achievement of these goals in the period 2010–20, but the progress already made can be summarized as follows:

- i. *Goal 1: Eradicate poverty.* The proportion of the population living below the poverty line dropped from almost 10 percent in 1990 to 7 percent in 1995 and to 4.1 percent in 2000.
- ii. *Goal 2: Achieve universal primary education.* Enrollment rates in primary education, for both girls and boys, are above 98 percent, and the literacy rate for the 15–24 age group is 93 percent.
- iii. *Goal 3: Promote gender equality and empower women.* The ratio of girls to boys in primary and secondary education is 93 percent. Women hold 21 seats in Parliament, and they enjoy a total absence of discrimination in access to work and in remuneration levels. They dispose freely of their properties and financial resources, and divorce laws give them an advantage equivalent to that of women in developed countries.
- iv. *Goal 4: Reduce child mortality.* The infant mortality rate is 25.8 per 1,000 live births, with an under-five mortality rate of 30.2 per 1,000 births. Important progress still remains to be achieved, although between 1990 and 2000 infant mortality decreased by approximately 40 percent.
- v. *Goal 5: Improve maternal health.* The maternal mortality ratio in 1995 was 70 deaths per 100,000 live births. It declined by 40 percent over the period 1990–2000. Eighty-two percent of all births were attended by skilled personnel. Here, too, progress has still to be made.

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- vi. *Goal 6: Combat HIV/AIDS, malaria, and other diseases.* Sixty percent of all women use one of several contraceptive methods. Morbidity due to tuberculosis is 37 per 100,000 inhabitants, and 79 percent of the cases of tuberculosis are detected. The general health of the population is considered satisfactory. A wide choice of health care services and high-level interventions is available.
- vii. *Goal 7: Ensure environmental sustainability.* Tunisia's performance in sustainable development, the subject of this report, is addressed below.
- viii. *Goal 8: Develop a global partnership for development.* Tunisia has ratified all of the treaties and agreements concerning environment, biodiversity, protection of natural resources, and reduction of greenhouse gases. It was among the first countries to adhere to the WTO. The free trade agreement with the EU, which was signed in 1996 and came into effect in 1998, should lead by 2008 to total integration into the European economy and, in parallel, to the progressive adoption of European rules, in particular regarding environmental standards and food safety. As of January 1, 2000, customs tariffs on European manufactured goods equivalent to those manufactured in Tunisia were abolished, exposing Tunisian industry to increased competition. Strategies and programs for modernization and reform of the regulations and Tunisian institutions affected by these changes are under way and can be expected to lead to the desired outcomes, with the technical and financial assistance of the partner countries.

32. In terms of sustainable development, Tunisia ranks first among North African countries, which include Morocco and the Arab Republic of Egypt, and almost the same as three Middle Eastern countries, Jordan, Lebanon, and Turkey. Its performance on education and gender parity is close to, although still below, the levels of northern Mediterranean countries (France, Spain, Portugal, and Greece). Its gender parity is the best of any southern Mediterranean country, with a total absence of discrimination in access to work and in remuneration. Tunisia's record on sustainable development and environmental protection, based on the few accepted and significant indexes, is comparable with the performance of neighboring countries of the southern Mediterranean and the Middle East. Table 2.1 in the Annex summarizes Tunisia's situation with respect to the MDGs in comparison with nine other Mediterranean countries.

a. Performance through Millennium Development Goal 7

33. Millennium Development Goal 7, which is examined in detail in this study, assesses three aspects of environmental sustainability that can be monitored through accepted targets (see table 2.1).

A.. *First Target: Integrate the principles of sustainable development into the country's policies and programs and reverse the trend toward the degradation of natural resources.* The objectives here present some difficulties, in particular those related to transport and energy, which presuppose important changes in transport means and types of vehicles and motorization, and those related to the share of renewable energy, given the low investments envisaged in this field by Tunisia's 10th Socio-Economic Development Plan in comparison with those allocated to the development of traditional energy sources.⁵

B. *Second Target: Halve by 2015 the proportion of people without sustainable access to drinking water.*

⁵ Given a 7 percent annual average growth in demand during the past decade, the power sector is in full expansion and is expected to register 77 percent growth between 2000 and 2006; 99 percent of this growth, however, will be from power stations.

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C. Third Target: Improve substantially the living conditions of slum dwellers.

Table 2.1 Environmental sustainability indicators, Tunisia, 1990–2010

Target	Indicator	1990	2000	2006	2010
A	Forestation rate (percentage of total area) ^a	3.2	3.3	4.4	n.a.
A	Protected area as percentage of total territory	n.a.	1.3	n.a.	n.a.
A	GNP (thousands of U.S. dollars) per ton of oil equivalent	5.6	7.4	n.a.	n.a.
A	Carbon dioxide emissions (tons per capita)	1.6	2.4	n.a.	n.a.
A	Reduction of greenhouse gases (tons per year)	—	932	—	1,165
A	Percentage of renewable energy in total consumption	~0	0.9	—	25
A	Transport energy savings (1,000 tons of oil equivalent)	—	—	—	210
A	Decrease in carbon dioxide from transport (1,000 tons)	—	—	—	620
B	Percentage of population with access to drinking water ^b	84.7 ^c	92.3	96.4	98.2
B	Percentage of population with home connection to drinking water	70.1 ^d	75.5	79.1	82.0
B	Percentage of rural population with access to drinking water	68.3 ^d	80.0	90.0	95.0
B	Percentage of rural population with home connection to drinking water	25 ^d	30	40	45
C	Percentage of urban population connected to the sewerage network	76	81	87	92
C	Dwellers as share of total housing	2.7 ^d	1.0	~0	s.o.
C	Volume of wastewater collected by sewerage systems (million m ³)	115	188	207	223
C	Sanitation rate (treated volume as percentage of collected volume)	78.3	85	91	95
C''''	Wastewater reuse rate (percent)	25 ^e	21	35 ^f	n.a.

n.a. Not available.

a. Forests, narrowly defined. The percentage of forest cover in relation to Tunisia's non-desert territory (about 52 percent of the total) was approximately 11.4 percent in 2000 and 12 percent in 2003.

b. By 2010, the share of the population without access to drinking water is to be reduced by at least 75 percent.

c. 1994 (INS, General Census of Population and Housing).

d. From Hamilton.

e. 1992.

f. National objective, 10th Socio-Economic Development Plan.

34. The achievement of the largest part of targets B and C primarily depends on the mobilization of the proper technical and financial means at the appropriate time. The targets are part of the policies and programs that have already been defined and successfully implemented for several years: access to drinking water, improvement of housing, and improvement of sanitation collection and treatment are the subjects of specific middle-term programs, and the only reservation concerns the rate of actual achievement, which is dependent less on financial constraints (which are not very important) than on the degree of maturity of the projects.⁶

35. The rise in consumption in Tunisia, which reflects good progress in living standards, did not affect savings, which rose from approximately 25 percent of income at the beginning of the 1990s to more than 29 percent in recent years. These savings, which are mainly directed toward access to housing, improvement of housing, and expansion of household credit, are essentially of a real estate nature. They are encouraged by the favorable and relatively flexible credit terms that have enabled more than 80 percent of Tunisian households to own their housing units and have contributed to a progressive elimination of slums (figure 2.3).

⁶ Analysis of NEAP achievements and comparison of these achievements with the initial forecasts (see chapter 3) show a rather general underestimation of time elapsed between the assessment of a large project or program and its effective execution.

Figure 2.3 Housing and poverty, Tunisia, 1985–2000

b. Indicators of Environmental Sustainability

36. Among the monitoring and assessment indicators of environmental performance on a national scale, three that have been recently developed could be used to assess Tunisia's performance. These three indicators, based on an economic approach to sustainability, are the costs of environmental degradation, net adjusted savings, and environmental sustainability index.

Costs of environmental degradation

37. The costs assessment of environmental degradation provides an approximate estimate of damage costs to the environment and could also help in ranking priorities. For the first time, a systematic determination of the seriousness and importance of environmental degradation in Tunisia was undertaken.⁷

38. The costs of environmental degradation in Tunisia in 1999 were estimated at between 383 million and 662 million dinars per year, or 1.5 to 2.7 percent of GDP, averaging 522 million dinars, or 2.1 percent of GDP.⁸ This is in addition to the cost of damage to the global environment, estimated at approximately 0.6 percent of GDP. The estimates were classified by environmental category, as shown in table 2.2 and figure 2.4.

39. These costs are relatively lower than in other countries in the region and are in fact the lowest, in terms of percentage of GDP, among the seven Mashreq and Maghreb countries. For example, annual degradation costs were estimated at approximately 4.8 percent of GDP in Egypt (World Bank 2002a) and approximately 3.4 percent in the Syrian Arab Republic (Larsen, Bolt,

⁷ The study, "Cost Assessment of Environmental Degradation in Tunisia" (Sarraf and Larsen 2003), falls within the scope of the collaboration program between NEPA and the World Bank, which was launched in 1995 along with two other studies: the 1995 Country Economic Memorandum (World Bank 1995b), and *Natural Resource Priorities* (World Bank 1997a). The estimates resulting from these studies are based on several hypotheses and simplifications, and the costs and sectoral breakdown therefore serve only as general orientation for decision-makers.

⁸ In 1999 Tunisia's GDP was estimated at approximately 25 billion dinars.

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and Sarraf 2003.).Nevertheless, the costs in Tunisia are not negligible. The most important damage occurs regarding (a) public health, in particular with respect to water-related diseases resulting from lack of sanitation in rural areas, respiratory diseases linked to air pollution, and inadequate waste disposal and treatment, and (b) productivity of natural resources, in particular the loss of agricultural productivity due to soil degradation and the impact on property of inadequate waste disposal and treatment.⁹

Table 2.2 Estimated average annual costs of environmental damage, Tunisia, 1999

Environmental category	Millions of dinars per year	Percentage of GDP
Water	153	0.61
Air	143	0.58
Soil and forests	129	0.52
Coast line	65	0.26
Waste	33	0.13
Subtotal	522	2.1
Global environment	148	0.6
Total	670	2.7

⁹ The relatively modest environmental degradation cost of waste management problems is mainly attributed to the fact that a comprehensive assessment of the impact of waste on health and natural resources could not be carried out, and so the impact of the absence of treatment of industrial and hazardous wastes was not included in the assessment

Figure 2.4 Estimated average annual costs of damage by environmental category, Tunisia, 1999
(percentage of GNP)

40. This analysis, although preliminary, does quantify, for the first time in Tunisia, environmental damage in monetary terms. The economic assessment of environmental damage is a tool that should allow decision-makers in the environmental field to draw the attention of financial authorities and the Tunisian government to the social costs and budgetary impact resulting from environmental degradation.

Adjusted net savings (ANS)

41. The adjusted net savings index offers the advantage of a rigorous economic base. It measures the real savings of a country on a macroeconomic scale, taking into account investments in human capital, depreciation of physical capital, and depletion of natural (mineral, energy, and forest) resources.¹⁰ Whereas gross savings is an index of national accounting and is used to measure current social welfare, net savings is an index of future welfare.

42. The ANS index is still incomplete and could be improved, since the means of measurement and evaluation of losses of wealth such as fishery resources, groundwater, and arable land are not yet able to integrate costs, and some positive contributions such as research and technological knowledge are not included in the index.

43. For Tunisia, the progress of the ANS index during the period 1976–2000 clearly shows two phases of development of the country (figure 2.5). The first, from the mid-1970s to the mid-1980s, is characterized by a high level of gross saving (20–25 percent of GDP), corresponding to the period of rapid increases in hydrocarbon prices, during which the exploitation of Tunisia's oil resources was accelerated. A steep decline in adjusted net savings (to 2–3 percent of GNP) was observed during this period. After 1986, consumption of natural resources decreased and investment in human capital increased, allowing adjusted net savings to stabilize at an average of approximately 15 percent of GDP. It is worth noting that for 1992–2000, adjusted net savings was equal to or higher than savings, reflecting a positive contribution of the factors that are taken into account.

¹⁰ Adjusted net savings = gross national savings – (fixed capital consumption + reduction of energy resources + reduction of mineral resources + net reduction of forest resources + value of damage caused by carbon dioxide) + education expenditures (considered as growth in resources).

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Figure 2.5 Adjusted net savings, Tunisia, 1978–2000

Figure 2.6 Adjusted net savings (ANS) by GDP and environmental investments as percentage of GDP, Tunisia and selected European countries, 1990

44. An international comparison places Tunisia in the leading group in 1990, with only 14 countries out of 90 having an equal or higher ANS, including 11 with a GDP of more than US\$4,000, at least twice as high as Tunisia's US\$2,000 (figure 2.6). Very few countries in the figure have both a high GDP and a high ANS; Tunisia's ANS is 19 percent.

Environmental Sustainability Index (ESI)

45. The environmental sustainability index classifies 145 countries on the basis of 5 groups of criteria, consisting of 68 base indexes (see table A2.2 in the Annex).¹¹ A disadvantage of the index is that it does not allow any weighting of the base indexes used and yields only a relative classification. Tunisia ranks 61st among 145 countries; it is in the middle of the Mediterranean

¹¹ The environmental sustainability index was derived in 2002 by the Yale Center for Environmental Law and Policy and the Center for International Earth Science Information Network at Columbia University.

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countries rated and is first in the southern Mediterranean group. With respect to anthropic pressures, it ranks 57th; in population aspects, 54th; and on integration into global efforts toward sustainable development, 49th.

46. *Conclusions.* The analysis based on synthetic indexes confirms the general conclusions of the study, which indicate that Tunisia's steady economic growth as of the mid-1980s provided the fundamental conditions for environmental sustainability. The challenge of sustainability, however, has not been completely met. The following chapters focus on the fields in which additional or new efforts must be made to consolidate the progress already achieved.

3. Progress of the Last Decade

47. The main objective of this chapter is to draw up an overall assessment of Tunisia's progress in environmental protection and natural resource management over the past decade. On one hand, emphasis is put on the achievement of the objectives set by the country as well as on the conditions that have helped or delayed progress toward the attainment of these objectives. Also, this assessment will look at the long-standing environmental causes that are likely to persist, especially the contradictions between environmental and developmental priorities.

48. The analysis of environmental problems will be organized in three parts, corresponding to the major challenges of Tunisia's sustainable development: natural resource management and rural development, pollution management in relation to the improvement of the quality of life in urban centers, and the implications of globalization and free trade.

3.1 Natural resource management

49. Tunisia's natural resources are limited in quantity and, to some degree, in quality and by their potential for exploitation. The amount of arable land per capita, less than 0.3 hectare, is among the lowest in the Mediterranean area. Forest area, although increasing appreciably, remains limited. Available and renewable surface and groundwater is less than 450 cubic meters per capita, again one of the lowest rates in the region. Although the export of phosphates, iron ore, lead, zinc, and fluorine was once the country's main source of revenue, mining resources today are currently restricted to phosphate production, which is stagnating at around 6 million tons.

50. The analysis focuses on the resources whose management adversely affects the sustainability of development in Tunisia—in particular, water and soil. The model for management of these resources during the past decade allowed the generation of important dividends, most of which were transformed into human capital and the satisfaction of the needs of an increasing urban population, as well as greater diversification of the economy. Figure 3.1 illustrates the relation between the rapid growth of food production and the expansion of irrigated areas at a time when population growth was slowing and the economy was becoming less dependent on agriculture.

a. Water resources totally exploited

51. *Fundamental socio-economic aspects of water resources and the Government's policy.* As demand for water by households and the economy continues to increase and maintaining the ecosystem, already weakened by natural factors, must be addressed, Tunisia faces considerable challenges in this sector. Water supply per capita, estimated at 450 cubic meters today, will be only 315 cubic meters in 25 years, when the population will reach 13 million (figure 3.2). Water resources have always been at the heart of economic policy concerns in Tunisia, especially because of their strategic role in the development of agriculture and food security. With a public investment of more than US\$2 billion in this sector since independence, a considerable infrastructure was built that allowed the mobilization of most of the economically exploitable resources. These were put at the service of economic development and social welfare, in particular through rapid expansion of irrigation (approaching 400,000 hectares) and universal access to drinking water.

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Figure 3.1 Population growth and growth in food production, Tunisia, 1966–2000

Source: World Bank, Statistical Information Management and Analysis (SIMA) database.

Figure 3.2 Trend in water resources, Tunisia, 1990–2010

52. Water policy in Tunisia is characterized by the following elements:

- Mobilization of all economically available resources through an increasingly integrated hydraulic infrastructure (dams, wells, installations to recharge aquifers, dispersion of flood waters, desalination, and treatment of wastewater)
- Demand management focusing on efficiency of use, water conservation, a progressive rise in tariffs, and the promotion of unconventional resources
- Provision of drinking water (urban and rural) and satisfaction of agricultural needs

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- Promotion of user associations, especially in rural areas, in the form of collective interest groups
- Management of quality based primarily on control of salinity and pollution deriving from discharges of domestic and industrial liquid waste
- Protection of the hydraulic infrastructure from erosion and silting
- Integration of aspects related to climatic variation (drought and flooding).

53. *Pricing policies.* Up to the end of 1988, drinking water was distributed and sold by the Tunisian Company for Potable Water (SONEDE) and irrigation water by the irrigation offices. This centralized the monitoring of mobilization and exploitation costs and water prices. In certain areas, water was produced and managed by collective interest associations, now known as groups with collective interest (GCIs) or, sometimes, agricultural development associations (ADA). This type of cost management and collection method (with additional state subsidies) was extended to all the new small irrigated areas, as well as to rural drinking water systems not managed by SONEDE. After the dissolution of the irrigation offices and the transfer of their management services to the Regional Commission for Agricultural Development (RCAD), water management accounting followed the system of the state budget. Since then, the central services of the Ministry of Agriculture's General Directorate of Rural Engineering and Water Exploitation (GD/REWE, formerly the General Directorate of Rural Engineering and Agricultural Water) have monitored most of the expenditure allocated by the RCDA for the management of irrigation water. In addition, the relatively rapid expansion of irrigation in the oases and through surface wells, which led to increasingly decentralized management, was not accompanied by systematic and comprehensive monitoring of the data, especially the economic and financial data.

54. The evolution of pricing policy and water resource management are characterized by two main elements, as summarized in table 3.1.

Table 3.1 Recovery of water costs, Tunisia

	AGRICULTURE				POTABLE WATER (d)	
	Public areas (RCAD and CIG) irrigated by:					
millimeters/m ³	Wells (b)	Oases (b)	Dams (b)	Other (c)	Surface wells (*)	SONEDE
A. Operation costs	95	16	77	70	100	425
B. Total economic costs (a)	206	37	202	210	133	430
C. Retail costs (average unit price)	44	13	101	51	100	425
D. Difference (total cost-price) = B-C	162	24	101	159	33	5
E. Ratio (Price/cost of operation) = C/A	47%	83%	131%	73%	100%	100%
F. Cost benefit ratio = C/B	22%	35%	50%	24%	75%	99%
Water volume	89 Mm3	507 Mm3	239 Mm3	33 Mm3	900 Mm3	na
Irrigated areas in hectares	23,300 ha	36,200 ha	112,700 ha	9,600 ha	200,200 ha	na

(a) Total economic cost, including operation costs, maintenance, renewal, mobilization, and subsidies (mainly for energy)
 (b) Based on extrapolating 1994 data (updated for 2002)
 (c) RCAD of Nabeul, Kairouan, Ben Arous: mixed irrigated (dams, wells, Medjerda Canal, Cap Bon, waste water)
 (d) Including urban, industrial, tourist uses
 (*) The operation cost includes all surface well and private well expenses, excluding energy subsidies.

Cost of A (cost of self-provisioning by operators) may be assimilated to retail costs (what is actually paid).
 In this case, E and D ratios would be 100% and 75%, respectively.

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- Although in the drinking water sector, selling prices cover 100 percent of operating costs, the same is not true in agriculture. This is important especially in light of the difference between the selling price and the economic cost, which includes public expenditure related to resource mobilization, subsidies to investments in the irrigated areas, energy subsidies, environmental costs, and so on.¹²
- During the past 10 years, within the scope of the soil and water conservation policy, significant progress has been made in the decentralization of water resource management, mainly centered on participatory management methods accompanied by state technical and financial support from the State.

55. *Encouraging results in the Irrigation sector.* The essential tool for the implementation of government policy in the agricultural sector is the Irrigation Water Savings National Program (IWSNP). Progress is measured by water savings rather than by the effects on the quality of water resources.¹³

- In terms of water savings per plot, the percentage of irrigated plots equipped with water saving equipment rose from less than 20 percent of total irrigated area in 1990 to 67 percent in 2001.¹⁴
- A 35 percent improvement has been recorded in irrigation efficiency at the national level. This improvement is responsible for a reduction in water supply to agriculture, varying from 9 percent for arboriculture to more than 30 percent for market gardening.
- Since 1997, consumption of irrigation water has been stabilized at an appreciably constant 2.15 billion cubic meters, despite the increase in irrigated area.¹⁵
- The profitability index (payback period) is 1.5 years for market gardening and 1.2 years for fruit tree cultivation.¹⁶

56. These results are summarized in figure 3.3A, which illustrates the trend in water consumption (from 1,574 billion cubic meters in 1990) and in value added in irrigation, as well as average consumption per hectare. Figure 3.3B shows the trend in the average price for irrigation water.

57. *A water policy oriented toward the welfare of the population.* Access by the entire population to drinking water of an acceptable quality and in sufficient quantity, and the progressive spread of domestic liquid waste sanitation, are the priority social objectives for Tunisia. Drinking water management is discussed in this section; sanitation policy is dealt with in the pollution section.

¹² The 1995 World Bank Country Economic Memorandum on Tunisia indicates, on the basis of a partial assessment, that subsidies in the water sector amounted to 80 million dinars.

¹³ WSIP (Water Sector Investments Program) includes a certain number of indicators that have not yet been measured.

¹⁴ The 2006 goal is 90 percent of the total irrigated area (approximately 360,000 hectares, as against 245,000 hectares in 2001).

¹⁵ GD/REWE communication for issue 2 of the "Blue Plan Notes," February 2003, special issue for the Third Water World Forum, Kyoto.

¹⁶ The profitability index is defined as investment/(gross margin after water savings equipment – gross margin without equipment).

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Figure 3.3A Trends in the irrigation sector, Tunisia, 1990–2000

Figure 3.3B Increase in the average price of irrigation water, Tunisia, 1990–2000

58. With respect to drinking water, the progress made over the past decade is obvious.

i) In urban areas,

- The connection rate to the public network rose from 88 percent in 1991 to approximately 98 percent in 2001 and is expected to reach 99 percent by 2006.
- Network output rose from 75 to 81 percent during the same period and should reach 85 percent by 2006.
- The water loss index fell from 8.6 cubic meters per day and per network kilometer to 4.8 cubic meters per day, with an objective of 4.2 cubic meters per day in 2006.
- Consumption fell from 80 to 70 liters per capita per day, probably thanks to reinforced progressive pricing (box 3.1). The service level and rapidity of the interventions have clearly improved.

Box 3.1 Drinking water tariff policies in Tunisia and impacts on consumption

Since 1974, SONEDE, which has the monopoly on drinking water for all urban areas and part of the rural networks, instituted a progressive pricing system that was regularly strengthened thereafter. The NAS adopted this system, with the same consumption brackets. The reduction of domestic consumption in the high brackets is one of the main effects, even though the non-differentiation between the industry and domestic consumers tends to conceal this result. The figures show the evolution of SONEDE nominal tariffs over five years and, for 1991, 1996, and 2001, the real cost of water for domestic consumers. The cost of drinking water for a consumer at the top of the third bracket (70 cubic meters per quarter, or approximately 150 liters per capita per day) rose from 375 to 637 millims (US\$0.28–US\$0.49) or, in constant value, from an index of 100 to 116. New tariffs with an average incidence of +6 percent were set in March 2003 by SONEDE and NAS.

ii) In rural areas,

- The percentage of the population with access to safe drinking water rose from approximately 55 percent in 1991 to 82 percent in 2001.
- Home connections increased from 18 to 32 percent over the period.
- The goals for 2006 are 90 percent for servicing and 40 percent for connection; for 2010, they are 95 and 45 percent, respectively.

59. *Quality management that needs to be improved.* Overall, drinking water production and distribution may be considered satisfactory and improving in urban and periurban areas. Problems persist in rural areas (except for the rural networks supplied by SONEDE with water quality, as well as with sustainability of management structures).

- The salinity of water distributed in southern Tunisia, estimated at between 2.3 and 3.4 grams per liter, is well above the recommended standard of less than 1.5 grams per liter. Projects to extend the large water transfer networks of the north to the south are open to question, and the solutions that have been adopted call for desalination of brackish water and perhaps, eventually, of seawater.¹⁷

¹⁷ Four plants are currently in service and treat water of salinity varying between 3.2 and 6 grams per liter. They are Kerkennah (old, renovated, 3,300 cubic meters per day); Gabes (22,500 cubic meters per day); and Djerba and Zarzis (24,000 cubic meters per day each).

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- Drinking water networks in rural areas for populations supplied from borewells or use of sources show significant bacteriological contamination due to the absence of regular chlorination.¹⁸

60. *The sustainability of water resources management is a major challenge for Tunisia.* Despite some impressive results, water policy in Tunisia faces a significant challenge that is directly related to the environmental sustainability of Tunisia's natural capital: How will it be possible, in the future, to reconcile quality management and ecosystem needs in an environment of natural fragility and climate change when exploitation of the available resources has already largely reached its limits?

61. In a study of water supply and demand in 118 countries during the period 1990–2025 prepared by an expert team from the International Institute of Water Management (IIWM), Tunisia was one of 17 countries that will experience “absolute scarcity” by 2025 (Seckler et al. 1999).¹⁹ One of the most important consequences is that these countries will not have enough water to maintain the per capita level of irrigated agricultural production even assuming higher efficiency, and satisfy drinking water and industrial demand and ecosystem needs. Difficult choices will have to be made, such as reducing water resources for irrigation and satisfying food demand through imports (see table 3.1).

62. Figure 3.5 clearly shows why Tunisia is facing a state of absolute scarcity. Even in scenario S2, in which the efficiency of resource use continues to improve and the share of irrigation drops from 30 to 35 percent, in 2025 Tunisia will be using 100 to 110 percent of its exploitable water resources. Moreover, it will remain vulnerable to the impact of climate change, which technically means that ecosystem needs will not be satisfied, putting into question the sustainability of the “total resource mobilization” policy. The public authorities are well aware of this situation and have been working for several years on the adoption of integrated management based on improvement of use efficiency in all sectors, identification of new resources that may be mobilized (desalination, reutilization of wastewater, and so on), and more rational management of demand.

¹⁸ In 1997, 50 percent of source water, 27 percent of public wells, 25 percent of water from networks installed by rural engineering, and 27 percent of water tanks failed to conform with bacteriological standards

¹⁹ Hydraulic “stress” is considered to set in below 1,000 cubic meters per capita. With, at present, 450 cubic meters per capita, and given its water and irrigation supply conditions, Tunisia may be viewed as managing this stress well. But with only 315 cubic meters per capita in the future, the situation becomes one of scarcity rather than stress.

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Table 3.2 Water resource use scenarios, Tunisia
(cubic meters per capita)

	Drinking water	Industry	Agriculture
Scenario S1	32	11	339
Scenario S2	49	21	224
S2 compared with S1 (percent)	+50	+90	-34

Source: NEPA estimates.

Figure 3.5 Water resource utilization scenarios and sectoral allocation of water resources

b. Management and conservation of agricultural land

63. *General overview.* Soil management in Tunisia has always been closely linked to water resource management and has been greatly influenced by rural employment and food safety policies. Public activity has been oriented toward safeguarding and protecting the resource on the basis of mainly technical solutions designed and implemented by the technical departments of the Ministry of Agriculture.²⁰

64. Of the country's 4.7 million hectares of arable land, which include 0.38 to 0.40 million hectares of irrigable area, land that is affected to a greater or lesser degree by wind and water erosion is estimated at approximately 3.5 million hectares, and irrigable land affected by more or less strong salinity is estimated at 0.12 to 0.14 million hectares. The land at risk of erosion is mainly located in the center of the country (48 percent) and in the south (36 percent).

65. Experts estimate the minimal loss to aridity at 11,000 hectares per year of fertile land, with pessimistic evaluations reaching between 20,000 and 30,000 hectares. Losses to salinity are estimated at 3,000 to 4,000 hectares per year in irrigated areas.²¹ The most affected dry lands are slopes, piedmonts, hills, and *Oued* banks, and the most affected irrigated lands are shoals suffering from lack of drainage and from waterlogging.

²⁰ In this section we refer to the new General Directorate of Development and Conservation of Agricultural Lands, which replaced the Directorate for Soil and the General Directorate for Soil and Water Conservation (decree dated February 13, 2001).

²¹ The loss equivalents measured in hectares do not provide a real measure of degradation—some of which is attributable not only to erosion but also to soil structure, infestation, and sterilization—but give only a very approximate estimate of quantitative production losses converted into hectares by productivity standards. A more comprehensive estimate of losses due to degradation is needed.

66. The overall achievements in development and conservation are significantly less than the strategy forecasts—in budgetary terms, a little more than 71 percent (407 million dinars). Depending on the nature of the works, there is much variance, as shown by table 3.3.

Table 3.3 Management and conservation of agricultural land: Summary of works

Type of work	Achieved	Completion rate (percent)
Development of drainage area (hectares)	893,000	133
Treatment of cereal-growing lands (hectares)	70,500	23
Maintenance and reparation of facilities (hectares)	337,000	39
Hill lakes (number of units)	580	58
Recharging of aquifers (number of operations)	2,525	116
Flood water sewerage (number of operations)	1,031	49

Source: Data provided by the Government of Tunisia.

67. The direct causes of soil degradation are the consequences of agricultural development and resource management that does not take into consideration direct impacts on soil.

- *Cereal growing profitability.* Cereal growing, which is strongly encouraged by high purchase prices and is considered a strategic activity, covers between 1.4 and 1.8 million hectares, yet the land actually suitable for cereal growing do not exceed 0.7 million hectares.²² The remaining part is more or less marginal land that is are largely exposed to erosion.
- *Prices for irrigation water.* The irrigation water savings policy is strongly subsidized (the irrigator bears only 45 to 50 percent of the equipment cost), allowing the equipping of approximately 67 percent of irrigable area as of the end of 2001 (according to GD/REWE), with an objective of 90 percent for 2006.²³ The links with the quality (salinity) of used water and the implications for soil salinity are not really taken into account, since the subsidy regime is the same whatever the hydrological and soil conditions.
- *Inattention to social and economic considerations.* The impact of operations with respect to the physical protection of the resource, and the socio-economic effects, are not well identified. Socio-economic considerations are missing from the elaboration of the strategy programs.

68. *SWC institutions and the participatory approach.* The transition from a purely technical approach to soil and water conservation (SWC) to the integration of local socio-economic factors is under way. It is only lately that an approach that includes the socio-economic effects of these developments has been implemented, taking into consideration local needs and integrating a participatory approach to the management and design of land development. The experience with the Natural Resource Management Project (NRMP) is still too recent to allow an evaluation of its effects, but important lessons are beginning to emerge (see box 3.2).²⁴

²² Cereal prices range between 29 and 31 dinars, the quintal per silo, depending on the year and the exchange rate. This is two to three times the world rates or the minimum intervention levels. The contribution of cereal to the value of agricultural production is less than 19 percent at the domestic market price but would be only 8 percent in economic terms. The best years for the Compensation General Fund, which dampens the differences between the purchase price to the producers and the sale price of end products (bread, pasta, semolina, and so on), are years of low cereal production, which allow for importing cereals and supplying the market at a low price. Cereal production (dry, irrigated, and cultivated) accounts for only 14 percent of agricultural jobs but is a source of revenue for more than half the country's farms.

²³ The Irrigation Water Savings National Program (IWSNP) was elaborated in 1995.

²⁴ The NRMP was financed by the World Bank in three governorates: Jendouba (north, Tell region), Kasserine (center, Dorsal) and Médenine (south, Jeffara).

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Box 3.2 Participatory approach and soil and water conservation institutions in Tunisia

Tunisia has a long tradition in the fields of surface water collection and mobilization and erosion control. Since independence, the state has launched ambitious water and soil development programs and policies. Thousands of hectares have benefited from intensive campaigns mobilizing significant material and human resources. The overall trend has been to adopt solutions focused on prevention or reduction of soil loss by physical means, but these techniques address the symptoms, not the cause of the problem. The real reasons for poor use of soil are not analyzed so as to allow for the appropriate corrective measures. Moreover, in the past farmers were rarely involved in the formulation and implementation of antierosion plans. Consequently, they were not interested in the soil and water conservation operations, and very few were willing to ensure the maintenance of the works once the developers left the region.

Despite the significant efforts in soil and water conservation (SWC) and the importance of the investments to date (amounting to more than 4 billion dinars since independence), the country cannot cover all the identified needs. Tunisia's geography exposes it to erosion, and the financial mobilization needed not only for initial investments but also for maintenance of works exceeds the country's capacity.

The new approaches based on SWC management aim at restoring the soil's fertility, enhancing its water storage and infiltration capacity, reducing runoff and erosion as much as possible to substantially improve harvests and farmers' net revenues, reducing risks, and even simplifying the works. This new natural resource management method acknowledges that participation by farmers, who are the primary users of the land, is the key to success.

Over the past several years, the approach to the design and implementation of programs and projects has moved from a sectoral and intervention-based form toward a regional and participatory approach under which stakeholders include (in addition to the administration) the population, enterprises, nongovernmental organizations, and businesses. The consequences are positive insofar as mentalities are beginning to change. Nevertheless, inadequate maintenance of the infrastructure, which is still not very sustainable, persists.

The intervention modes and methodology currently used derive from the SWC administrative organization and procedures implemented several years ago; their character has not been changed by recent partial modifications. Thus, the strategic planning practices and directives are rather centralized. Moreover, the service attributions and technicians' prerogatives, as well as the operational methods of the regional commissariat for agricultural development, have led to compartmentalization of work, while the technical departments continue to keep control over the design and procedures of SWC development, with the beneficiaries unable to play a role.

The Tunisian case shows that significant progress has been made in reflecting in the field the political will to change the forms of intervention. The country is testing in practice the main provisions specified in the methodological and organizational plan. These new methods are being currently introduced into the technical departments' procedures and into the laws in force. Training of the support teams that work with local groups is crucial if the relationship between the institutions and the population is to be changed.

Source: Based on Bonnal (1998).

c. Forest resources management

69. At the beginning of the 1990s, Tunisia's forest area was only about 470,000 hectares. Today, forests cover approximately 630,000 hectares (about 370,000 hectares of natural forest and 260,000 hectares of plantations) as a result of reforestation amounting to more than 35 percent over 10 years. Deforestation (an average of 300 hectares per year) and forest fires, which in some years affected up to 1,600 hectares, contributed to a reduction of net reforestation to only 160,000 hectares over 10 years.

70. This result is considerably below the goal set for the past decade of 320,000 additional hectares, including 130,000 hectares on state property and 170,000 hectares on private land. In fact, the public reforestation objective was nearly reached (120,000 hectares, 92.3 percent of the goal), but private initiatives remained well below expectations (only 46,000 hectares, 27 percent of the goal). The 10th Plan calls for the planting of 115,000 hectares of forest, that is, for an annual afforestation rate 50 percent higher than during the past decade. The plan also specifies the implementation of an integrated forest development project to be added to

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the current forest development plans (already set for approximately 440,000 hectares), bringing the total areas benefiting from development plans to more than 550,000 hectares.

71. The causes of the poor past results (which may also affect the achieving the goals of the 10th Plan) are:

- *Failure to take a participatory approach.* The design of the development plan is too technical and does not take into consideration the needs and habits of the people living in the forest or in bordering areas. The main concern of the plan is soil and water conservation, rather than economic integration (forestry, breeding and other forest-related activities).
- *Weak market demand.* The demand for forest products is mainly for low-quality wood fuel (charcoal). Meanwhile, forests are underexploited (the production of wood represents only 40 percent of the potential) and production is mainly focused on cork. This is likely to discourage the private sector from investing in the forest sector.

72. There has been some progress toward a participatory approach to forest sector management. Under the Second Forest Development Project (1994–2001), cofinanced by the World Bank, the participatory integrated development approach was incorporated into the development plans while taking into consideration social integration (the roles of administrators and user communities), other activity sectors (rural and village employment), and the rural development concept. This evolution was made possible by the Forestry Code of 1988, which eased restrictions on usage rights and opened facilities to integration of the population into forest development. In 2001 the forest administration created a directorate for the socio-economic development of forests.²⁵ As for private sector participation, this report recommends a feasibility study that would address the main constraints, market needs, and the financial and economic incentives to be developed to ensure private sector investment in the sustainable development of forests.

d. Energy resources management

73. *Energy Balance.* In 2000 primary energy consumption reached 6.5 million tons of oil equivalent (TOE), of which 58.5 percent was in oil products and 40 percent in natural gas. Approximately 80 percent of the natural gas goes for power generation by the Tunisian Company for Electricity and Gas (STEG) and by private concessionaries, 15 percent for industry, and 6 percent for the service sector. The use of oil products and coke for power generation had almost ceased four years ago.

74. New discoveries of oil and natural gas fields, although made on a regular basis, hardly restrain the growth of the energy deficit, which is the consequence of increasing consumption (4.1 percent growth during the past 10 years, as against 2.1 percent before that). Tunisia produces 78,000 barrels of oil per day and has been importing oil since 2000. Natural gas production has been in full expansion for the past eight years with an annual production of 1.8 billion cubic meters, but is insufficient to cover the needs and the energy deficit, which appeared in 1995, amounting to an average of 325 million dinars a year in 2000 and 2001.

75. An energy deficit of more than 3 million TOE is expected in 2010 despite the projected growth of proprietary resources. (See table 3.4 for the projected consumption trend to 2006.)

²⁵ Decree dated February 13, 2001, on the organization of the Ministry of Agriculture.

Table 3.4 Trends in energy deficit, Tunisia, 1997–2006

(millions of tons of oil equivalent)		
	9th Plan 1997–2001	10th Plan 2002–6
Oil	3.8	3.6
Gas	2.7	3.6
Total	6.5	7.2 (trend: 2.1% annual growth)

76. STEG plans to reduce consumption growth from 2.1 to 1.05 percent per year through a reduction of 1 million TOE by 2010 as a result of energy savings, use of efficient technologies, and substitution of renewable energy.

77. Because of the industrial energy conservation policy and the improvement in STEG performance (its network losses are only 11–12 percent), Tunisia's energy performance fell from 0.416 TOE per 1,000 dinars of GDP in 1990 to 0.294 TOE in 2000, an improvement of approximately 30 percent (see figure 3.6).

Figure 3.6 Final energy intensity, Tunisia, 1990–2000

e. Fishery resources management

78. *Overview.* Between 1970 and 1990, fishery resources declined from approximately 550,000 tons to less than 300,000 tons. Available stocks followed the same trend, falling from an average of 160,000 tons to approximately 80,000 tons. The variability of pelagic resources, however, strongly depends on the measurement period, which does not prove an actual reduction. Fishing is an essential activity that employs more than 6,000 persons, directly and in related industries, and contributes more than 1 percent of GNP. It is also a strong export sector, even though performance has been deteriorating over the past four years, probably due in particular to stagnation and sometimes to a fall in production. Protection of fishery resources and rational management of exploitable stocks are the main current concerns.

79. The principal reasons for depletion of exploitable fishing resources are:

- Excessive harvesting of valuable species due to the rise in the number of fishing units and to equipment modernization.

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- Insufficient enforcement of fishing restrictions and prohibitions. Elimination of the use of destructive equipment and techniques has been partly successful but could still be improved regarding the authorized locations and depths.

80. Knowledge of fish catch resources, which had been mainly based on reviewing of old studies and inventories, has been improving as a result of the efforts of the National Institute of Marine Sciences and Techniques (NIMST). This agency carries out surveys and updates old evaluations, although in limited numbers and in a fragmented way.

81. The problem to be resolved is to build the capacity of national and regional fishery departments to carry out resource assessment, set fishing authorizations (zones, species, quotas by species, and so on) and contribute to seafloor protection.²⁶ Some capacity-building measures are included in the project for capacity building in agricultural-supporting departments.

f. Coastal Zone Protection

82. Tunisia's coastal area covers approximately 1,300 kilometers, including almost 600 kilometers of sand beaches. Except in a few places (totaling 30 to 40 kilometers according Paskoff et al., the coast is regressing, in part because of unusually severe natural phenomena and anthropic pressures.

- Exceptional tides, causing a brutal regression of the coast and the disappearance of beaches in certain locations that are insufficiently protected.
- High urban and tourist use: 65 percent of urban agglomerations (approximately 4 million inhabitants) and 94 percent of hotel capacity (about 200,000 beds) are concentrated on 250 kilometers of shoreline, less than 20 percent of the coastal area. Urbanization and development of seaside tourist zones ("feet into the sea") increase the effects of natural phenomena by impeding the displacement and recharging of dunes and beaches; they also lead to the creation of spontaneous residential areas and secondary residences, amplifying the effects of planned development.
- Pollution from heavy industries and the most important power plants, most of which are concentrated in coastal areas or on lakes linked to the sea, as at Gabes, Menzel-Bourguiba and Bizerte, La Goulette-Rades, and Sousse
- Multiplication of water mobilization and retention works for irrigated agriculture, soil protection, and protection of cities against floods, which reduces the sea sedimentary deposits and in the coastal saline depressions (sebkhas) and impairs their reconstitution capacities.

83. *Impacts on tourism policy.* Tourist areas and resorts are not subject to any general regulations oriented toward environment protection. Density, building height, size of hotel units, proportion of natural or developed green areas, and so on are at the sole discretion of the promoters who, despite the low purchase price of the land, maximize their profit expectations through densities that are much higher than the standards set in the 1970s.²⁷ The development model adopted to date tends to approach the model employed in northern Mediterranean countries in the 1950s—on, for example, the Costa Brava and the Balearic Islands in Spain and on France's Languedoc coasts—which today has been abandoned.

²⁶ The national bodies are the General Directorate of Fishery and Aquaculture and the NIMST, which is affiliated with the Ministry of Higher Education and Scientific Research.

²⁷ See the case of the new tourist area of Hammamet-South, with 25,000 beds and a marina concentrated on less than 7 kilometers of coastal area.

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84. Awareness of the risks of poorly controlled development in coastal areas has led the Tunisian authorities to create temporary tools for predictive management of the coastal zones. These include:

- An inventory of coastal degradation and the development of protection, restoration, or rehabilitation actions according to the observed gravity of the problems and the possibility of intervention.²⁸
- Emergency operations (ripraps) to protect adjacent roads, residential areas, and the like.
- Design of master development plans for sensitive coastal areas to propose tolerable development and occupation limits.
- Determination in these master plans of priority sensitive areas to be subject to management plans and protection perimeters, and the strengthening of zoning regulations for lands subject to pressure.
- Design of beach occupation plans in the developed tourist areas, as well as in areas that experience high visitation rates by residents on weekends and in the summer season.
- Pilot actions for regeneration of highly degraded beaches and dunes.

85. Since the development of these programs, almost 80 percent of the coastal area has been the subject of land use documents that take into account risks and environment fragility. The conditions for intervention by public authorities in the expropriation or repurchase of lands that are subject to strong urban pressure have been determined for two-thirds of the coast. The inventory of zones of natural and cultural interest in the coastal areas and lagoons, in the form of geographic information system (GIS) data or at least of digitized cartography on appropriate scales, is almost complete.

86. The choice for the future is between (a) quantitative development that continues the trend of the recent past or (b) less quantitative development that is more respectful of the environment. This latter option, along with other policies and commercial measures, is likely to ensure a better economic ratio in new hotel units and, in general, the growth of incomes and currency flows in the tourist sector.

87. The tourism development strategy incorporates among other things, a scenario that reconsiders the current design of tourist areas and integrated resorts.²⁹ A strategic environmental assessment (SEA) of the long-term impacts of the various coastal tourism development scenarios seems to be a priority. Using as a basis the tolerance concept for large coastal areas, the integration of tourism, urbanization, coastal development, and receptivity of concerned environments, the study should serve as a framework for long-term planning.³⁰

3.2 Pollution management

88. Pollution management in Tunisia, beginning with the creation of NAS in 1974 as a public health measure, became a national priority with the establishment of NEPA in 1988 and the Ministry of Environment and Land Use Planning in 1991. This development reflected a growing priority for pollution arising from several factors, including rapid urbanization and increased household income, the diversification of the economic structure and the increase in

²⁸ Four of the 10 priority zones are currently the subject of studies on the execution of the proposed developments.

²⁹ The strategy is being elaborated with World Bank assistance, and has reached the recommendation stage regarding preferential scenarios and action plans.

³⁰ Within the scope of the Mediterranean Environmental Technical Assistance Program (METAP), the European Investment Bank, on the opening of credit lines for the hotel industry, requested in 1994 a general study on tourism development and environmental conservation by Société du Canal de Provence-Comete Engineering, recommending, among other things, the significant reduction and even cancellation of some announced programs related to new tourist zones or to the extension of existing zones.

industrial and manufacturing activity, and international market constraints. Three important sectors are examined in detail in this section: water pollution, air pollution, and waste.

a. Sanitation and control of water pollution

89. NAS's projects and programs clearly improved the situation in the cities where it manages the liquid waste and storm-water networks, as well as sewage treatment plants. The past decade (the period of the 8th and 9th Development Plans) saw the following achievements:

- The network increased from 5,000 to 10,250 kilometers.
- The annual volume of collected wastewater rose from 118 to 201 million cubic meters.
- The number of sewage treatment plants increased from 28 to 61, allowing the treatment of 169 million cubic meters per year (84 percent of the collected water), up from 79 percent in 1993.
- The population connected to the sewerage system rose from 3.02 million (75.6 percent of the population of the cities served by the NAS and 61 percent of total urban population) to 4.37 million (82 percent of the served cities and 71 percent of the urban population).

90. Problems, however, still remain in the servicing of the cities, as well as in the treatment of liquid waste, partly due to the growth rate of housing to be connected and the need to correct past deficiencies.³¹ It shows that:

- In the served cities, the number of households (or of housing units) not connected to the sewerage system increased by 10 percent, rising from 190,000 to 209,000.
- Nearly 14 percent of the population in cities not served by the NAS is still not connected to the sewerage system or is very inadequately connected.
- Of the 187 million cubic meters of water consumed each year (135 million cubic meters domestic wastewater, 34 million industrial water and 18 million for tourist use), most (170 million cubic meters) is likely to cause pollution because of its type of effluent (raw or inadequately treated wastewater) or discharge site. The effects of these liquid discharges are not accurately known because of lack of measurement and monitoring networks at the most sensitive locations.
- Sewage treatment plant outputs vary from 81 to 92 percent, according to the process and the seasonal load level. Terrestrial waste, which accounts for 31 percent of the discharge (31 million cubic meters reused for irrigation and 22 million cubic meters released directly into Oueds and lakes, the remainder being discharged into the sea) can cause pollution, and this problem is currently being addressed.
- The elimination or treatment of sludge from sewage treatment plants remains an unresolved problem. Studies and actions are under way at NAS to find a comprehensive solution.

91. The causes of these problems are multiple: financial (availability of funds), technical (selection of sites), institutional (division of roles), and technical capacity for implementation and operation. One of the identified causes is poor planning of urban extensions and partial non-compliance with urban planning:

- Sanitation master plans are developed to define and design the networks and stations for the existing cities or agglomerations and their planned extensions. They accompany the

³¹ Most of the actions to improve existing problems are included in the National Program for the Rehabilitation of Popular Areas (NPRPA), which is aimed at improving the infrastructure of spontaneous housing areas.

master development plans and town planning but cannot always be designed according to longer-term planning of urban development areas.³²

- Even when urban planning is designed according to sanitation requirements, the numerous exceptions to the plan and its regulation often mean major obstacles or extra costs related to installation of the waste water networks.
- Creation of industrial parks, even when preceded by an environmental impact study, cannot accurately anticipate the industrial waste volumes and pollution not yet identified, and the development of activities in an existing area prevails over sewage treatment and sanitation considerations.

92. Recovery of the increasingly high system operating costs of the network and sewage treatment plants, as measured by collected and treated marginal volumes, is an important problem for NAS. Despite regular increases in tariffs, for a long time the agency could only cover a little more (10 to 15 percent) than its direct operating costs (excluding the depreciation and financial costs of the large installations, which were covered by a state subsidy). The freezing of tariffs after 1998 led to a significant reduction of NAS's self-financing capacity.³³ The NAS invoice represents, on average, one-third of the total invoice for drinking water plus sanitation, but a policy of price transparency (as with the SONEDE) would rapidly raise this share by approximately half.

93. The tariff on treated liquid waste supplied to farmers by the local agencies of the Ministry of Agriculture has been fixed at 20 millims per cubic meter. This tariff is lower than that for conventional water, which varies from 80 to 160 millims for surface water and from 120 to 150 millims for well water distributed through private participation in infrastructure (PPI) or by collective interest groups. Despite this low cost, farmers prefer to use conventional water, which is less constraining.

94. Given NAS's current policy of outsourcing the management of entire networks, with or without their sewage treatment plants, and its objective of generalizing this practice by 2010, the cost recovery issue will become increasingly acute as the installations multiply and system cost prices will rise. Moreover, NAS is entrusted with certain tasks (management of sanitary landfills, maintenance of stormwater networks) that are remunerated through contracts within the scope of a program mutually agreed on and financed by the State. Services with direct and contractual remuneration partially generate unpaid debts.

b. Air pollution management

95. Air pollution in Tunisia does not reach worrisome levels, despite critical local situations, particularly near polluting industrial facilities or in some urban centers with high traffic intensity. In the absence of a performing and sufficiently extended measurement network (there are three monitoring stations in the three main urban agglomerations and two stations near the chemical group in Gabes); the real impacts of the measures already taken for air protection are not well known.

96. The Tunisia Country Report to the NFCCC in 2001 provides in Table 3.5 a breakdown of air pollution in Tunisia by source, the three main sources being energy production, the construction materials industry, and transport.

³² Master plans generally cover a 15-year period; town planning does not have a set period.

The sanitation infrastructure for wastewater and stormwater is the most sensitive to relief and topographical constraints.

³³ The tariffs were revised in March 2003, with the same price increase system when moving from low brackets to higher brackets, once a consumption threshold is exceeded.

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Table 3.5 Air emissions by pollutant and source, Tunisia

Polluting agent	Fixed sources (percentage of total)					Transport (percentage of total)	Quantity (tons)
	Energy	Industry	Housing	Services	Agriculture		
Carbon dioxide	29.2	23.1	10.3	5.7	5.8	25.9	15,182,000
Carbon monoxide	6.1	0.3	51.6	0.7	1.6	39.7	387,000
Nitrogen oxides	15.6	13.4	7.9	1.6	10.2	51.3	7,640
Sulfur dioxide	23.6	42.1	12.2	4.4	11.1	6.5	7,870
Organics	26.4	0.4	29.5	0.2	1.8	41.7	6,980
Methane	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,540
Nitrous oxide	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	23

n.a.: no data available

Source: United Nations Framework Convention on Climate Change (UNFCCC) data, October 2001; Government of Tunisia.

97. During the past decade, efforts to reduce and control air pollution were directed toward three operations:

- Identification and inventorying of air pollution sources; evaluation of emissions by area and type of pollutant
- Development of standards and of a monitoring network
- Reduction of pollutant emissions in three fields: energy production, industry, and transport.

98. In the energy production sector, the reduction of air pollutants is the direct consequence of STEG's drive to save energy through the substitution of natural gas for heavy fuels and the introduction of cogeneration. Since 1990, mitigating measures consisted of: (a) the closing of three very polluting production facilities, in Sfax, Mahdia, and Megrine; (b) the installation of filters in power stations, cement plants, the iron and steel industry, foundries, and other industries, for a total of 4.4 million dinars, including 20 percent in grants from the Pollution Abatement Fund (FODEP); (c) and the reduction of sulfur dioxide emissions from the units of the chemical group in Gabes (41 million dinars, financed by the European Investment Bank).

99. In transport, the mitigating measures taken mainly consisted of: (a) vehicle control (regulations on exhaust fumes and fuel consumption); (b) a transport and traffic master plan for the city of Tunis (not yet implemented); and (c) the promotion of clean fuels. The most important measure in the latter was the introduction of unleaded gas in 1993 and the reduction of its sale price to bring it close to that of super leaded gasoline. Technical aspects (standards and control) prevail over financial incentives for the use of clean fuels. It will be necessary to introduce renewable and nonpolluting energies, and overall reduction of emissions through traffic and vehicular regulations: differentiated taxation, fuel pricing, and public transport pricing systems.

100. The measures that are expected to have the most important impacts on industry and transport concern the transformation of the refining process (at STIR in Bizerte and a new refinery in Skhira) to reach, sulfur and lead percentages lower than the current levels, as follows:

- For super gasoline, decrease lead from 0.5 to 0.15 grams per liter, by 2008
- For heavy fuel oil, decrease sulfur from almost 4 grams per liter to the tolerable maximum content of 1 gram per liter

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- For gas oil: decrease sulfur from 1 to 0.3 gram per liter in 2008.

c. *Solid waste*

101. The total annual production of waste is approximately 2.3 million tons.³⁴ It is broken down as follows:

- Domestic waste: 1.74 million tons
- Industrial waste: 0.32 million tons, of which 0.07–0.09 million tons is hazardous waste
- Packaging waste: 0.055 million tons
- Hospital waste: 0.015 million tons
- Sewage sludge: 0.11 million tons
- Other (slaughterhouse waste): 0.06 million tons.

102. Currently, the technical performance of solid waste management in Tunisia may be summarized as follows:

- The coverage of municipal waste collection services is estimated at 90 percent in rural areas and 95 percent in urban areas.
- Thirty-four districts, with a total population of 2.1 million (34 percent of the country's urban population), have access to sanitary landfills; other municipalities still have uncontrolled dumps.
- The total quantity of municipal waste disposed of in sanitary landfills is estimated at 730,000 tons per year, or about 40 percent of the country's total municipal waste.
- Five percent of household refuse is recycled.
- Plastic and metal packaging wastes total approximately 4,000 tons per year, or about 8 percent of total waste; 50 percent of the packaging wastes are separated and recycled.

103. The programs that have been adopted and are expected to be implemented during the 10th Plan (2002–2006) call for:

- The establishment of nine sanitary landfills (for 101 municipalities, with a capacity of 800,000 tons per year), with regional sorting and transfer stations. The overall objective is to be able to treat 1.47 million tons of municipal waste generated by 135 districts, amounting to 86 percent of total waste.
- The construction of a third domestic waste transfer station, for Greater Tunis (Ariana).
- Studies of the rehabilitation of existing dumps.
- The establishment of a treatment center for industrial hazardous waste (70,000 tons per year during the first phase), as well as the establishment of three collection and transfer stations.
- The continuation or launching of studies for 19 categories of waste.

104. With the development of the Solid Waste Management National Program (SWMNP) and the entrusting, in 2000, of its implementation to NEPA, local communities limited their activity to the collection of municipal waste and its transport to the 400 old garbage dumps or to the sanitary landfills managed by NEPA (1 landfill) or NAS (4 landfills). These two organizations were not initially responsible for the management of municipal waste.

105. The prospects for the future of the waste management sector depend on the institutional solutions chosen for the management of the facilities (NEPA as operator and manager; on formation of agencies, or inter-district services, with or without delegation of management to the private sector; see Basler 2003); and, especially on the long-term financing of operation and maintenance (see chapters 4 and 5).

³⁴ In 2001. The figure excludes wastes from demolition, construction, and the like, as well as phosphogypsum (approximately 5 million tons per year, in Gabes, Gafsa and Sfax).

106. Cost recovery for collection, transfer, treatment and disposal of municipal waste in Greater Tunis is currently only 15 percent of the total cost. As a result, billing covers only 41 percent of the cost with a billing collection rate of only 37 percent. The annual deficit is almost 5.1 million dinars.³⁵ It is probable, given the longer transport distances, that the overall cost of treatment at the nine new sanitary landfills will be significantly higher, yet the "customers" for these landfills consist mainly of municipalities that are weaker financially than Greater Tunis. The issue in the long term is the distribution of these costs between the State (subsidies); local taxes, which currently cover only collection and cleaning costs that in many districts are more than 50 percent of the operational budgets; and future pricing systems.³⁶

107. As for industrial waste, the management structure of the Djeradou treatment center and the regional collection, storage, and transfer centers has not been defined.³⁷ The absence of an industrial land register directed toward production of solid waste (equivalent to NAS's CADRIN for water pollution) and the lack of surveillance, control, and a monitoring system for solid waste, from production through collection and transport to the regional centers, is also a constraint on the planning of management activities and prediction of the total costs. These measures are specified in the 10th Socio-Economic Development Plan.

108. There is no positive or negative sanction for industrial pollution of whatever form—air, water, or solid waste. All of the programmed mitigating measures for depollution or pollution prevention are still financed by the public budget (see chapters 4 and 5), except for the recycling or promotion of certain packaging waste—the most visible form of waste, but also one of the least polluting.³⁸ Thus, the question remains of what financial incentives should be used to force manufacturers that produce industrial hazardous waste to use the treatment centers, once they are set up. The study on the financial incentives is not expected before 2005, one year before the treatment center begins its operations.

3.3 Trade and environment

109. Tunisia was the first country of the MENA region to sign an Association Agreement with the European Union, in 1995, and it is a member of the World Trade Organization (WTO). Like any developing country, Tunisia faces the consequences of globalization and trade liberalization, as well as the challenge of ensuring an equilibrium between trade and the environment. A rapid evaluation was carried out to estimate the impact of changes in the generic costs of production (water, energy, and raw materials) stemming from compliance with more rigorous environmental standards in key export and import sectors. Four export sectors were examined: fertilizers, textile, olive oil; and paper and cardboard. The two import sectors analyzed were metals and steel, and plastics.

110. The sensitivity analysis of the export sectors assumed a 100 percent increase in the costs of water, energy, or raw materials.

- Production and exports in the fertilizer sector are more sensitive to increases in the costs of water and energy than in the other sectors examined, and the increases may have a negative impact.
- In the paper and cardboard sector, an increase in the cost of energy or raw materials has an important effect on exports.

³⁵ The cost is now estimated at 9.20 dinars per ton; after the upgrading of installations (Borj Chékir dump), it is expected to rise to approximately 12 dinars per ton and then to 17–18 dinars per ton, with the inclusion of sorting and selective collection operations. In the future, a cost of between 32 and 35 dinars per ton is expected (Basler 2003).

³⁶ Collection and cleaning costs for Greater Tunis are estimated at 45 dinars per ton (Basler 2003).

³⁷ One recommendation, made in a 2003 study by Tecsalt, is to entrust a private operator with the management of the center. The remuneration method and origin of the source of funds are pending issues.

³⁸ Investments are the complementary amounts to the shares of industrialists (from the Special Pollution Abatement Fund, FODEP) or of the entirety of common infrastructure. Operating costs are borne by the public budget as a result of the current situation. Recently, a 2.5 percent tax aimed at financing FODEP was applied in the 2003 budget to the turnover of importers and producers of plastic raw materials.

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- For all export sectors, the impact of a 100 percent change in the cost of water is completely manageable. A 100 percent increase in energy costs does not have an important effect on the spinning and fabrics and olive oil sectors.

111. The results of the same analysis for import sectors are as follows:

- A 100 percent rise in the water price is completely manageable for both sectors examined, but an increase in energy cost could significantly increase competition from imports.
- A change in the price of raw materials could have severe consequences for the plastics sector in the domestic market.

112. Although Tunisia suffers from a shortage of water, production and trade in the sectors examined are more sensitive to changes in energy prices than in water prices. Policies for sustainable water management may be implemented without having an important competitive impact on these economic sectors. Greater attention, however, must be paid to energy savings, as well as to environmental regulations that affect the use of energy in these sectors. The impact of a change in raw material prices on the fertilizer, paper and cardboard, and plastics sectors deserves thorough analysis in order to identify the sub-sectors that are most affected in terms of production and competitiveness. Given the importance Tunisia accords the protection of its exports, this type of analysis must be deepened by the Trade and Environment Committee established within the office of the secretary of state for environment.

4. Environmental Policies and Institutions

113. The general overview in chapter 3 clearly shows that in terms of socio-economic policy, Tunisia has developed an important institutional framework and is achieving significant progress in the management of its environmental resources. This places it in a good position to achieve its international development objectives and to consolidate the integration of its economy into the global economy.

114. The aim of this chapter is to evaluate Tunisia's policies and institutions to assess whether they are appropriate for ensuring the integration of economic and environmental policies at the macroeconomic and sectoral levels and for addressing the important challenges posed by sustainable and integrated management of natural resources and land development. This evaluation covers (a) the environmental policy and the supporting incentive tools; (b) the legal framework for the implementation of this policy; (c) the investment programs and their relation to strategic priorities; and (d) the degree of participation and intervention by civil society and access to information. Since the efficiency of public expenditures in the environmental field has never been evaluated before in Tunisia, chapter 5 tackles this issue in detail.

4.1 Sustainable development policy

a. Since Rio

115. Tunisia's official position, formalized in 1995 in its national action plan for environmental and sustainable development "is in line with the Agenda 21 goals agreed on at the 1992 Earth Summit in Rio. Tunisia's policy is to promote a "comprehensive development framework based on social equity and the guarantee of people's welfare in a sound and protected environment" (Tunisia 2001).³⁹ This policy is based on three priority areas of intervention aspects: (a) the promotion of a competitive economy based on an efficient partnership between the public and private sectors; (b) the promotion of an equitable society based on national solidarity, with the objective of eradicating poverty and social exclusion; and (c) a rational and sustainable promotion of the country's potential (urban and rural) and its natural resources and environment.

116. The implementation of the strategy was entrusted to specialized institutions, most of which were created during the past decade. These institutions are responsible for the implementation of the strategy either directly through their own means or through supervision of the actions of other entities. The Ministry of Environment is in charge of coordination of the strategy; this effort was strengthened in 1993 by the creation of the National Sustainable Development Commission (NSDC). The Tunisian Observatory for the Environment and Sustainable Development (TOESD) has been in charge of monitoring progress since 1994.

117. Gaps in the general performance. Table 4.1 summarizes the progress achieved in terms of policies, strategies and sectoral actions. Greater progress has been made in the technical fields, from the identification of problems to the preparation of standards and regulations, than in the "softer" economic and social fields such as the identification of financial tools, capacity for analysis (prospective, cost-benefit, social and environmental strategic studies, etc.), and public participation in the design, implementation, and monitoring

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of sectoral policies. This "progress in two gears" is a good indicator of the efforts that are still necessary if Tunisia's sustainable development objectives are to be achieved.

Table 4.1 Institutional progress and environmental policies, Tunisia

Policy, strategy and actions: level of progress	Report of damages and risks	Inventory of damages and causes	Treatment or urgent actions	Specialized technical organizations	Technical strategies for prevention	Standards and resolutions	Economic and financial instruments	Intervention, participation of NGOS	Information, public awareness	Actual changes in behavior
	A	B	C	D	E	F	G	H	I	J
Natural resources										
<i>Forests</i>	++	++	+	++	-	++	-	+	+	+
<i>Water and soil conservation</i>	++	-	+	++	-	--	--	-	-	-
<i>Management of water quality</i>	++	-	+	++	-	+	--	-	-	+
<i>Fishery resources</i>	++	-	-	+	-	+	--	-	-	-
<i>Potable water (urban)</i>	++	++	+	++	+	++	++	--	-	--
<i>Potable water (rural)</i>	++	+	+	++	-	+	+	++	-	-
<i>Energy resources</i>	++	++	+	++	+	-	-	--	-	--
Air pollution										
<i>Energy production</i>	++	++	++	++	+	++	+			
<i>Transport</i>	+	+	-	+	-	-	--	--	-	--
<i>Other (construction, services)</i>	+	-	--	+	-	++	-	--	-	--
Water pollution										
<i>Waste water</i>	++	++	++	++	++		++			
<i>Industrial water</i>	++	++	++	++	+	++	--	--	-	-
<i>Rainwater pollution</i>	++	-	+	+	-					
Waste management										
<i>Municipal waste (collection)</i>	++	-	+	+	-	--	--	-	-	--
<i>Municipal waste (treatment)</i>	++	-	+	--	-	--	--			
<i>Package waste</i>	++	++	+	+	-	+	+	+	+	--
<i>High-risk industrial waste</i>	++	-	+	++	+	+	--	--	-	--
Urban planning										
<i>Coast</i>	++	-	+	++	-	+	--	-	--	--

++	Completed or requesting partial adjustments
+	Underway
-	Preliminary stage
--	Not yet designed
	Not specified

118. Gaps in the sectoral performances. The degree of achievement of sectoral policies for environment and natural resource management differs significantly from one area to another. The long-term importance of their challenges, at the level of the sustainability of the actions to be carried out, as well as on their socio-economic impact, is also significantly different. The variances in performance are particularly important in the following sectors:

- Natural resource management. The main concerns are (a) the level of exploitation of natural resources, which is rapidly approaching the limits, and the overexploitation of groundwater; (b) overexploitation of tracks and marginal lands; and (c) the need to enhance the efficiency and sustainability of agriculture and forests. Despite considerable investments, the impacts of current policies and programs are not well known, especially concerning soil conservation (the fight against erosion and salinity) and water management (irrigation savings, quality, and reutilization). Additional analysis must be carried out on the basis of measurements and simulations in order to determine the implications—the impacts on environments, productivity, and revenues. The effects on soil salinity in irrigated areas and on long-term productivity resulting from strategies of water savings and overuse of exploitable resources are not yet well measured, even though there is an agreement on the risks.
- Rural development. Water and soil conservation and the protection of forest areas and tracks are increasingly driven by local economic requirements, often in conflict with agricultural practices that are justified by short-term financial interests (with or without subsidies and incentives). The reform of agricultural development policies through stronger integration of environmental concerns and through decentralization to local or regional levels is currently under study. In the long run, reform must lead to significant changes in the population and employment structures and new requirements and new installations, which should be consolidated by the development of rural lands.
- Municipal and industrial waste management. Currently, no integrated policy exists for the collection, treatment, and disposal of these wastes. NAS and NEPA are responsible for the management of sanitary landfills, whereas these functions should be the responsibility of the municipalities, the private sector, or inter-municipal agencies. Today, the municipalities are only in charge of the municipal waste collection system. The Mediterranean Environmental Technical Assistance Program (METAP) and the Private Sector Promotion for Infrastructure Project financed by the European Commission are assisting Tunisia in its analysis of possible privatization of the municipal solid waste sector. This would require the development of a cost collection system, a review of the legal framework in order to allow outsourcing and concessions to the private sector, and the creation of an inter-municipal system responsible for integrated waste management, with technical assistance from NEPA.

b. Beyond Johannesburg

119. In its sustainable development policies for the near future, and as mentioned in its national report at the second Earth Summit in Johannesburg, Tunisia intends to focus its efforts on institutional aspects, where the deficiencies of its existing systems are important. In particular, it will:

- Develop capacity to anticipate changes, formulate programs, and evaluate strategies aimed at upgrading enterprises and improving the competitiveness of economic sectors, services, and the national territory with respect to the development opportunities that might be created by globalization.
- Develop practical approaches favoring the implementation of sustainable development principles at all levels; the process of national Agenda 21 is one of the tools to be developed.

- Promote coordination mechanisms and increase the synergy between economic development stakeholders in working toward the sustainable development objectives defined in national Agenda 21.
- Develop the tools for better integration of environmental costs and benefits into development while ensuring sustainability requirements.
- Build the capacity of enterprises and production units to continue their activities and develop in the context of globalization.
- Promote policies and tools aiming at better mobilization of international cooperation in favor of the implementation of sustainable development.
- Carry out the necessary reforms to improve local level governance for better participation by all stakeholders in socio-economic development through the creation and the consolidation of solidarity mechanisms among the various groups of Tunisian society and between society and economic actors, taking into account the opportunities for economic development and social equity.
- Develop information systems for the decision-making process at all levels and build the appropriate mechanisms for the exchange and communication of relevant data for development.

4.2 The legal and regulatory framework

120. In order to implement these sectoral strategies and policies, the environmental governance system in Tunisia is based on (a) a legal framework (laws and codes, decrees, and implementation orders) that entrusts mandates to specialized institutions within ministerial departments or under their supervision; (b) a system of environment impact assessment (EIA); (c) incentive tools; and (d) a partnership with the private sector and the civil society.

a. Environmental institutions

121. The development of the institutional and legal framework was mainly driven by priority areas that concern people's living conditions, the conservation/waste of resources, pollution control efforts, and the protection of the coast. Tables 4.1 and 4.2 in the Annex summarize chronologically the main characteristics and activities of environmental institutions and the implementation of sectoral strategies.

122. *Sanitation.* The acute deficit in the management of municipal sanitation services and the lack of waste treatment led to the creation in 1974 of NAS, with World Bank financing and with missions well defined by the regulation and by-laws.⁴⁰ NAS is responsible for developing, operating, managing, and ensuring the maintenance of the waste water network before the transfer of these tasks to private companies. It was entrusted with two new missions that were not initially specified in its mandate but that may affect its operations, in particular, general control of water pollution, added in 1993, and the management of four sanitary landfills in the northwest of the country, completed in 1998 within the scope of the project for safeguarding the watershed of the Oued of Medjerda. These two additional missions are in conflict, since NAS simultaneously manages facilities that may be very polluting in case of malfunction and also regulates water pollution, making it both a judge and an involved party in water pollution.

123. *Energy conservation.* The need to conserve energy resources through a policy and instruments for promoting energy savings was behind the creation in 1985 of the Energy Control Agency (ECA). In 1998 the ECA became the National Renewable Energies Agency (NREA). Since 2002, it has been part of the Ministry of Industry and Energy. The NREA aims at mitigating or reducing the expected deficit in the country's energy balance. Its missions are to control, approve, and finance energy audit operations; combat air pollution;

⁴⁰ The roles of NAS in the fight against water pollution and in stormwater treatment has just been reconfirmed. The ministry in charge of the Equipment DHU remains responsible for protection of cities against floods.

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and promote renewable energy. It is not yet clear whether the NREA will continue to exercise its functions of control and monitoring of air pollution, which lie within NEPA's competence.

124. *Pollution control.* The need to coordinate and strengthen depollution and environmental protection programs led to the creation of NEPA in 1988. (It should be noted that the most significant and most concentrated pollution generally originates from large public enterprises.) NEPA's main objectives are to study and monitor the state of the environment; the implementation of environmental policies; the approval of environment impact assessment studies; the control and monitoring of effluents; research; environmental training and education; and approval of pollution control investments. In addition, it is in charge of investment programs and projects that do not lie within its legal mandate as public regulatory agency. NEPA's responsibilities include (a) the Solid Waste Management National Program (SWMNP), in which NEPA plays the role of an operator and regulator of municipal and industrial waste and ensures implementation and coordination between the concerned partners such as municipalities and the private sector, and (b) the establishment and management of urban parks and the beautification of roads and avenues, which remain within the competence of the municipalities and local communities.

125. *Coastal protection.* The government's concern about the coastline's exposure to risks, whose pressures and development impact may be irreversible, took shape in the establishment of the National Agency for Coastal Protection and Management (NACPM) in 1995. This agency is responsible for coastal protection, improvement of the use of the coast, conservation of the marine environment, and development and management of sensitive areas. Since the ministerial restructuring in 2002, the NACPM has been under the supervision of the Ministry of Equipment, Housing and Land Use Planning (MEHLUP). Its mission has not changed since its transfer from the Ministry of Environment.

126. *Monitoring, analysis, and evaluation.* Two specialized agencies have been established to monitor progress, measure the efficiency of the efforts made, and adjust environmental and sectoral policies:

- The Tunisian Observatory for the Environment and Sustainable Development (TOESD), created in 1994 and affiliated with NEPA, carries out studies on environmental policies and develops national sustainable development indicators.
- The International Center for Environmental Technologies of Tunis (ICETT), established in 1996, is responsible for studies, applied research, documentation, information, and training at the regional level. Its aim is to encourage the promotion of environmental technologies and a better contribution by the national and international scientific communities to the actions of the Ministry of Agriculture, Environment and Hydraulic Resources, public agencies, and the private sector. Since 2000, ICETT has established, with the cooperation of METAP, a regional unit for technical assistance on environmental impact assessment (EIA). This unit offers workshops on capacity building in EIA, prepares evaluations of EIA systems in METAP beneficiary countries, and maintains an EIA database.

127. *Information systems.* The 1990s witnessed the creation and development of an important system for the measurement and localization of environmental physical data. These inventories, partially accompanied by a geographic information system GIS, constitute a base of the minimum knowledge required to direct and quantify sectoral policies and actions. The work is more or less advanced in different sectors but is expected to be completed in the short or medium term—in two or three years, or in five to six years for inventories that have just begun.

128. In the field of management of natural resources, inventories of surface and groundwater have been completed, and the strengthening of the means of measurement of their state is planned in the short term. The General Directorate of Water Resources (GD/WR) has been responsible, for more than 30 years, for the maintenance and publication of annual inventories on all aspects of quantitative and qualitative water management, including

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pluviometry, hydrometry, the exploitation and state of deep water tables and groundwater, recharging of aquifers, piezometry, boring, and monitoring of underground water quality. The national inventory of forest and pastoral areas was drawn up in 1994 and provides a comprehensive information on the state and evolution of forests and tracks. Agricultural maps, a digitized cartography inventory project that will provide information on the potential, capability, and fragility of agricultural lands and their current use, are in progress. (Three regions, out of 10, are still under study.)

129. In the pollution field, inventories of risks to the natural environment from urban and industrial pollution are being prepared and are being incorporated into the GIS, allowing the determination of pollution concentrations and siting. This work is carried out in parallel by MAEHR itself, NEPA, and NAS. Since 1999, NAS has kept an inventory of water pollution sources in approximately 6,000 industries. Specific inventories and analyses for municipal and industrial waste are under way to identify, quantify, and localize wastes by type and industrial branch, with the aim of developing efficient management systems allowing the collection of effluents and their diversion to appropriate treatment locations.

130. The state of the coastal area was the object of a systematic inventory and a classification, by erosion and shore loss risk, of each section of the shore. The NACP is about to complete the inventories prepared on the occasion of studies for the management of sensitive areas or development of zoning tools for the sites most threatened by urbanization and large infrastructure and development projects.

131. In the field of reduction of air pollution, ICETT maintains a real-time network for the management of pollutants in the city of Tunis. Statistical inventories and geographic locations, however, are still incomplete.

132. The main weakness of the information systems of many organizations is the lack of continuity and of systematic, regular monitoring. In the absence of permanent means of monitoring and evaluation, databases are prepared on the basis of specific regional or local surveys, often in the context of the preparation of a given project, and follow-up is frequently lacking. The second weakness is in the communication of information. Either the data are not gathered by the same geographic and physical entities (because of a lack of correspondence), or the entities lack the means to integrate the information into regular exchange networks. This phenomenon is not limited to environmental issues. A strategy of reform and development of statistical information is being worked out on the national level.

133. *Sanitary controls and hygiene.* The main area for interventions by the Ministry of Public Health is the impact of environmental damage on the health of the population. A Directorate for Environmental Health and Protection (DEHP) was created within the ministry by decree 81-783 of June 9, 1981 (article 19), which specified and complemented the tasks given to the ministry in 1974. The directorate intervenes at several stages of the prevention and control of pollution impacts on health:

- Upstream, through its participation in the development of standards related to the quality of drinking water, the quality of bathing water, the use of seawater in thalassotherapy, the disposal of raw effluent and treated wastewater, and the use of the latter in agriculture, as well as more general duties related to the quality of the environment as it affects human health.
- On an operational level, through its regional services, in the development of national programs, including the fight against disease carriers, prevention of water-related and environment-related diseases, supervision of bathing water, management of hospital waste, and so on.
- Downstream, through the control, analysis, and monitoring of the environment, through its regional services and through a network of laboratories and sampling and analysis stations: hygiene laboratories; testing of wellwater, irrigation, bathing, and drinking water, and treated wastewater; sanitary inspections of water and treatment installations;

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analysis of ambient air; inspection and inventory of shelters for epidemic carriers (lagoons, dumps, oueds, and so on).

134. The directorate's affiliation with a ministry other than those with which the environmental operational institutions are connected is likely to guarantee the objectivity of its reports on damage caused to the environment, which are, furthermore, based on World Health Organization (WHO) standards and directives. The directorate is also able, through its direct access to morbidity and epidemiology statistics, to assess the effects of environmental damage on health and thus contribute to evaluation of degradation costs.

135. *Scientific research.* In addition to environmental institutions, with their operational, facilitative, and control roles, several research and educational institutes contribute, each in its own specialty, toward improving the knowledge and techniques that allow the enhancement of the state of the environment and protection of natural resources. Some are directly affiliated with MAEHR—ICETT; the National Institute of Research for Rural Engineering, Water and Forests (INREGREF); the Tunisia National Institute of Agronomy (TNIA); the National Institute of Agricultural Research (NIAR); and the Dryland Institute—or with other ministries, as is the case with the National Institute of Sea Sciences and Technologies (NISST) and public health research institutes that participate in national programs or research supported by international cooperation.

136. In the field of the development and dissemination of knowledge, the increasing number of nongovernmental scientists' associations contributes to reinforcing the activities of the public institutions mentioned above. (See the section on NGOs below.) The role of these groups is recognized, but encouragement for them is still too weak and is often variable. It is worth mentioning that the results of their work, like those of the public research organizations, are not always sufficiently disseminated. Operational agencies thus do not fully benefit from these efforts, which could significantly improve their activities. This assessment applies more generally to poor inter-sectoral coordination.

137. *Intersectoral coordination.* Except for the NACP, the NREA, and the DEHP, all environmental institutions are under the supervision of MAEHR. The powers of this new ministry clearly show the horizontal role the environment must play in key water sectors and soil conservation from the point of view of demand for and supply of these resources and the consolidation of the existing synergies between sectors. The secretary of state for environment in MAEHR is responsible for the activities of the former Ministry of the Environment, which was created in 1991. The objective is to reinforce the synergy and harmonization of the programs previously initiated by several intervening parties for the integration of environmental concerns and sustainable development into sectoral economic policies.

138. Within MAEHR, the General Directorate for the Environment and Quality of Life (GD/EQL) is responsible for the design and coordination of national strategies and action plans for environmental protection in urban areas and the industrial environment and for conservation of the natural and rural environment, in particular the preservation and conservation of biodiversity. Improvement of the quality of life in urban areas also lies within the actions the GD/EQL carries out or supervises with respect to open spaces and town improvement; specific tax resources have been just assigned to a new program in these fields, in collaboration with the concerned services within the ministry in charge of local public communities and groups (collectivities).

139. MAEHR is also responsible for natural resource management. Its role has been reconfirmed and reinforced by a law of February 2001 that places groundwater and surface waters, soil, forests and tracks, fauna and flora, and practically the entire rural environment under its direct management. The missions entrusted to the ministry and to its technical departments clearly specify their responsibilities and means of action:

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- *General Directorate of Forests (GD/F)*. Forests, biodiversity, natural parks and reserves, wetlands; covers the general directorate's missions of conservation of natural and rural environment ex- Ministry of Environment and Land Use Planning (MEAT).
- *General Directorate of Development and Conservation of Agricultural Lands (GD/DCAL)*. Water and soil conservation; conservation plans and intervention perimeters for the development of watersheds.
- *General Directorate of Rural Engineering and Water Exploitation (GD/REWE)*. Coordination of all water producers, distributors, and consumers, of whatever nature and origin, including SONEDE and NAS, the principal network operators.
- *General Directorate of Agricultural Products Quality Control and Protection (GD/APQC)*. Protection of plants and seeds; control of use of pesticides, herbicides, fungicides, and so on; environmental quality control of agricultural products (certifications).

140. To support the specialized general directorates, MAEHR includes horizontal institutions, information providers, holders of databases, and promoters of development studies, in particular, the National Observatory of Agriculture (NOAGRI) and the General Directorate of Studies and Agricultural Development (GD/AAD), whose analysis and statistics departments help produce technical analyses.

141. Coastal management (NACP) and urban planning (which presently consists mainly of prospective management of urban environments) do not lie within MAEHR's direct competence, after it was attached to the Ministry of Equipment.

142. *Weaknesses and limitations of the current institutional setup.* One of the most urgent actions would be to remedy the overlapping and ambiguities of the agencies responsible for water and air pollution. As indicated above, the NAS and NEPA have become the operators and managers of sanitary landfills. If this role was to continue and expand, with the new programs under study and elaboration, the agencies would find themselves in a particularly ambiguous situation. That is, they would have to approve the projects they are promoting and, subsequently, to operate the smooth running of the installations they will have to manage.

143. NEPA, as a national agency, is responsible for pollution control, while the NREA, under the supervision of the Ministry of Industry and Energy, is responsible for air pollution control and the promotion of renewable energy. A third important stakeholder in this field is the STEG, which has the monopoly on power and gas distribution and on power production or concessions to power producers. STEG also develops public information and awareness programs for the adoption of less energy consuming equipment and installations and for better control of energy consumption. A redefinition of the roles and responsibilities of each of these institutions is essential (see chapter 6); this would separate the pollution control and prevention functions, which would have to be assigned to regulators such as NEPA, from the promotion and energy conservation functions, which lie within the competence of developers and operators such as the NREA and STEG.

144. It is important to redefine the missions and responsibilities of these agencies in such a way as to achieve integrated pollution control. NEPA, as a regulator, should be responsible for all forms of pollution control and NAS, the NREA, and STEG, as developers and operators, should be in charge of installations and their operation.

145. In addition to the ministries and specialized agencies, the government has established horizontal institutions in the form of commissions or higher councils that are charged with bringing together the representatives of all the authorities concerned with the development and monitoring of the country's general policies. The National Sustainable Development Commission (NSDC), established in 1993, is responsible for the coordination and ratification of the country's orientation in terms of sustainable development and compliance with the

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international commitments made in this field. The Interministerial Committee for Land Development examines the contents and objectives of national planning and regional development plans and submits them for approval.

146. Other councils, such as the Higher Water Council, the Council for Conservation of Water and Soil, and the Council for Energy, are, in their more restricted and specific fields, responsible for evaluating the relevant policies, proposing or ratifying the guidelines, and stating their opinions on all decisions lying within their fields of competence. These bodies are privileged places for bringing together opinions of various sources, in particular those of responsible persons within ministries or national organizations not directly involved in the daily management of a specific field.

b. Environmental impact assessment (EIA)

147. Law 88/91 of August 2, 1988, on the establishment of NEPA, enacted environmental impact assessment (EIA) as a preliminary stage for the completion of any development project. The content, development, and approval procedures of the EIA, as well as the nomenclature of projects, are defined by legal texts, including implementation decree 91-362 of March 13, 1991, regarding EIA.

148. Within the scope of METAP's program for the institutional strengthening of the EIA system in the Mediterranean region, ICETT carried out an evaluation of the system with the aims of enhancing EIA efficiency to support the objectives of environmental protection and sustainable development; raising the quality of EIAs to the level of the best international practices; and facilitating the development of harmonization between the Tunisian system and the World Bank and European Union systems.

149. In general, the EIA system is well established in Tunisia. NEPA includes a unit for the administration, review, and monitoring of EIAs, and approximately 1,200 EIAs are examined annually. NEPA has developed terms of reference for various types of projects to serve as guidance for the operators and consulting firms that benefit from experience with EIA preparation.

150. For some national projects (large dams, motorways, development of tourist areas, and hotel development), impact analyses are sometimes made after the projects have been (tentatively, if not definitely) approved, planned, and financed by public or private developers. The EIAs therefore cannot question the project location or size but, at best, propose corrective measures to mitigate the most obvious direct negative impacts.

151. Some major deficiencies in the institution of the system and the EIA instrument are:

- Failure to analyze the indirect or cumulative effects—induced urbanization, combined impacts of adjacent or neighboring development areas, effects of marinas on coastal traffic, and so on. Impact analyses are limited to each project as though it was isolated, without taking into consideration the cumulative effects of several projects of the same nature on the scale of a watershed, a coastline, or an agglomeration. Environmental analyses also seldom take into account the effects, good or bad, of other projects or operations in other economic sectors, since the NEPA approval or visa only applies to a specific project and to one public or private developer.
- Absence of consultative mechanisms in EIA regulation; lack of participation of the public and inadequate dissemination of EIAs.
- Shortcomings in EIA preparation—namely, the absence of project scoping; the failure to consider the environmental alternatives or describe the zones of influence; environmental management plans' lacking schedules for mitigation, monitoring, and institutional capacity-building; and the lack of attention to global aspects related, for example, to the greenhouse effect.

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- Failure, as yet, to integrate socio-economic dimensions into the EIA because of the lack of regulations, procedures, and methodologies.

152. Tunisia has not yet integrated strategic environmental analyses (SEA) into its policies and programs, although the concept is known. SEA should be understood as taking into consideration all of the economic, social, and environmental aspects in decision-making for sustainable development. (See the recommendations in chapter 6.)

c. Financial incentives and sectoral subsidies

153. The programs and projects developed during the past 10 years more or less cover all the issues of environmental protection and natural resource management that merit particular attention. These actions fall within the scope of a general approach whereby the State finds and mobilizes the financial resources either to make investments itself and through its agencies or to subsidize private initiatives. The Tunisian Government financed public collective investments in environment and natural resource management in the amount of 228.7 million dinars. The financing operations consist of six main funds involving the management of Treasury funds or of subsidies to private initiatives.

154. *Depollution Fund (FODEP)*. The Depollution Fund was established in 1993. It was allocated 22.5 million dinars, in addition to 11.5 million dinars in concessionary loans from the Kreditanstalt für Wiederaufbau (KfW). It was able to finance 252 depollution projects, for a total estimated amount of 50 million dinars, in which the share of FODEP subsidies reached 10.5 million dinars (approximately 20 percent of total investments).⁴¹ Eight years after the fund's creation, its resources are only half used. For the credit share (the FOCRED mechanism), loans only represent 28.5 percent of total investments, while the beneficiaries are in fact entitled to 50 percent, in addition to 20 percent of subsidies and 30 percent of self-financing contributions. Only half (125) of the projects were the subject of a loan application, and 97 loan agreements were concluded with commercial banks. The extension of FODEP's activity beyond industrial depollution is under consideration in order to use largely unallocated resources (12 million dinars remaining out the original 22.5 million dinars). The approval in the last budget of a 2.5 percent tax on the value of the production and importation of plastic raw materials should quickly increase FODEP's permanent resources.

155. *Tourist Zone Environmental Protection Fund (TZEPP)*. The TZEPP, also established in 1993, is half financed by a hotel tax, which is 1 percent of turnover. The proceeds generated from this fund rose from 4 million dinars in 1993 to 9 million in 2001. During the 8th Socio-Economic Development Plan, the total amount of grants and subsidies reached 18 million dinars, and during the 9th Plan, that total was 37 million dinars.⁴²

156. *Environmental Monitoring Fund for Packaging (EMFP)*. The task of EMFP, established in 1997, is based on the producer-recycles principle for some packaging waste (bottles and other plastic packages, except for milk, and metal cans). That is, the manufacturers of the packaging, as well as importers of packaging or of already packaged products, themselves ensure that the packaging wastes are recycled; or they entrust this task to specialized companies; or else NEPA (using funds from taxes on weight adjusted according to package type) takes direct responsibility for recycling. In practice, the NEPA option prevails, as the markets for direct recycling are well below the quantity of packaging produced. A complete assessment of EMFP has not yet been made, as the concrete initiatives are too new

⁴¹ 2001 assessment; 450 applications were submitted. Forty-six of the funded projects are for waste collection and recycling, and of these, only 21 were executed.

⁴² These are subsidies granted to municipalities to finance sanitation and cleaning operations; the assessment of real consumption is not known.

to evaluate.⁴³ Expenditures for fund management are included in NEPA budgets; it appears that there is no, or practically no, public subsidy to the system.

157. *Irrigation Water Savings National Program (IWSNP).* The IWSNP, established in 1994, grants subsidies of up to 40–60 percent on water-saving irrigation equipment and installations. By the end of 2001, the total amount of subsidies granted from public funds (excluding customs duties and value added tax exemptions) had reached 210 million dinars, including 18.3 million dinars over the 8th Plan and 191.7 million over the 9th Plan. The area funded through the IWSNP amounts to 157,000 hectares, in addition to approximately 124,000 hectares previously equipped, with an average subsidy of 1,340 dinars a hectare.⁴⁴ Since the implementation of this program, in effect since 1996, the consumption of irrigation water has stabilized at a little more than 2.1 billion cubic meters, which corresponds, and given the extension of irrigated area, to an average decrease of 120 cubic meters per hectare.

158. *Subsidies for soil and water conservation.* Programs and public activities for soil and water conservation actions include subsidies for farmers wishing to develop their lands (plantations, hill lakes). An assessment of these subsidies is not available, but the amount would be marginal compared with public investments.

159. *Subsidies for energy-saving activities.* For energy savings, subsidies granted by the NREA (or, formerly, by the Energy Management Agency) to hotel owners, industrialists, and, more recently, the service sector come from credit lines or subvention packages granted by financial backers, supplemented by contributions from the public budget.

160. Although the establishment of these funds in the form of incentives or subsidies helped decrease the government's financial contribution, improve living conditions, and contribute to the fight against pollution and the squandering of resources, they did not lead to changes in behavior in the society vis-à-vis environmental protection and natural resources. With respect to de-pollution, for instance, the polluter-pays principle has never been operational. According to this principle, as defined by the Organization for Economic Co-operation and Development (OECD 2002), the polluter should bear the total cost of de-pollution set by the competent administration, without subsidies. Environmental subsidies create perverse incentives, since in the long run they tend to foster the establishment of polluting industries and so are apt to increase rather than reduce overall pollution. They also create distortions in trade commerce and investment. In Tunisia, total financing is ensured by the public budget in the form of subsidies or exemptions for private actions. Industrialists who do not abide by the state's de-pollution and prevention programs are subject only to a verbal warning or the payment of a fine, and the cost of environmental degradation is not integrated into their overall budget.

161. The same observation applies, but in an even more fundamental way, to natural resource management. Farmers' economic behavior is guided by national rules on production purchase prices, which do not encourage optimal utilization. The social concern underlying these agricultural policies standardizes behavior in whatever the region and soil type, to the detriment of protection or the recharging of groundwater tables.

162. Modernization programs for cleaner production and energy savings were only developed thanks to specific strong financial and tax incentives. Advantages in terms of savings and brand image are not yet felt as a real positive counterpart to the financial and technical efforts made by industry and agriculture, with the state's help, for the environment.

163. The interventionist approach of recent periods, although perfectly adapted to remedial operations, should not remain the rule, within the scope of a vision of prevention and long-term predictive management. Further analysis of the objectives and optimal utilization of

⁴³ For 1998, plastic bottle recycling was allotted 1.5 million dinars. Proprietary secrecy prohibits NEPA from publicizing other figures, since the number of producers for certain products is so limited, sometimes involving a single producer.

⁴⁴ The cumulative total would be 281,000 hectares, or 36,000 hectares more than the announced figure of 245,000 hectares (67 percent of irrigated land). It probably includes equipment or rehabilitation of areas already equipped or developed.

these funds and subsidies is recommended. This is in order to convert them into incentive instruments or instruments of economic and financial disincentive. These should be based on the polluter-pays principle and on the integration of the costs and advantages of environmental protection and optimal management of natural resources.

d. Role of the private sector and nongovernmental organizations

164. *Private sector.* The private sector is active in the environmental field. A large number of Tunisian consulting firms offer their services for the preparation of EIAs, more than 1,200 of which are reviewed by NEPA each year. The market has become competitive, sometimes to the detriment of product quality. Many private operators make the payment of consultants' fees conditional on NEPA's acceptance of the EIA.

165. The private sector benefits from activities of the Depollution Fund (FODEP), the NREA incentives for energy conservation projects, and financing under the Montreal Protocol for the reduction of ozone-depleting substances (in refrigeration and aerosols). Production of solar water heaters has benefited from a Global Environment Fund (GEF) project. The private sector also handles household refuse collection in a large number of districts and is NEPA's subcontractor for the management of transfer stations and of the Greater Tunis sanitary landfill. The private sector would be also ready to invest in a public-private partnership for the collection and valorization of packaging waste in Greater Tunis.

166. The Government encourages private sector participation and financing in infrastructure projects. The Ministry of Development and International Cooperation (MDIC) requested World Bank assistance in studying private participation in infrastructure in Tunisia, and assessing the possible contribution of the private sector to the achievement of the investment goals defined in the 10th Development Plan. The study, which is cofinanced by the European Commission, has two phases. Phase I consists of diagnosing the infrastructure and private participation in infrastructure (PPI) in Tunisia and examining international good practices and the regional context of these reforms. The main objective of phase II is to elaborate a middle- and long-term vision (strategy) and the formulation of proposals for short-term concrete reforms (action plans) on the basis of the diagnostic analysis in phase I. The strategy has been finalized and was discussed with the Government of Tunisia in June 2003. MAEHR also requested METAP assistance for a study on possible privatization of operation of the sanitary landfill in Greater Tunis. The recommendations of this study are summarized in chapter 6.

167. Nongovernmental organizations (NGOs). The number of environmental NGOs is estimated at 157 and is rising. The participation of these organizations in environmental protection activity, although still limited, is significantly increasing, as shown in table 4.2.

Table 4.2 Participation of nongovernmental organizations (NGOs) in environmental protection activities, Tunisia, 1988–2002

Field	1988	1992	1995	2000	2002	Growth, 1992–2002
Environmental protection	25	41	61	72	102	× 2.5
All fields, national coverage ^a	9	13	17	n.a.	18	× 2
All fields, regional or local NGOs	6	11	14	n.a.	n.a.	
Fauna and flora	4	7	11	n.a.	n.a.	
Cultural and historical sites, medinas	6	7	15	n.a.	n.a.	
Others or not determined	—	3	4	n.a.	n.a.	
Scientific associations	5	9	18	24	27	× 3
Ecodevelopment associations	4	7	9	21	28	× 4
Total Tunisian NGOs	36	57	88	117	157	× 2.8
Existing international NGOs	3	4	8	n.a.	n.a.	

—n.a.: not available

a. The Tunisian Agency for the Protection of Nature and the Environment (TAPNE): TAPNE includes approximately one-third of the members of all the organizations dedicated to environment; in 1995 it had 4,500 members.

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168. Given their limited financial resources (low operational expenses partially covered by public subsidies) and the limitations this places on their activities, most of the NGOs direct their actions more toward information and awareness campaigns rather than the management of concrete projects.⁴⁵ Their assistance in terms of consultancy and communication of official messages, however, is real, thanks to their closeness to the affected populations, which MAEHR cannot achieve, since its local and regional presence is extremely limited. For some specific fields (fauna, flora, and remarkable sites), some associations are primary sources of information and awareness and may even carry out direct management (e.g., for medinas).

169. The recent years have witnessed a rapid multiplication of NGOs active in ecodevelopment projects (or integrated development projects), where their actions are concrete and have benefited from significant budgets. A survey conducted by MAEHR should soon shed light on their activities, projects, number of members, mobilized funds, and sources of funds. This survey is not yet complete, but an extract of its findings for 19 NGOs managing 36 projects brings out some significant points.

170. The total value of projects conducted by the 19 NGOs amounts to approximately 8.3 million dinars, with a predominance (73 percent) of ecodevelopment projects. Three-quarters of the funds put at the NGOs' disposal comes from the Tunisian state or the EU and is mainly intended for these development projects (see figures A4.1 and A4.2 in the Annex). The remaining amount (approximately 2 million dinars) allocated to other projects directly related to environmental and nature protection or to the management of natural resources is important compared with the State's overall budget. The NGOs' reliance on the state budget or on foreign financing sources may jeopardize their independence and the implementation of their programs.

171. The participation of local communities and groups in the definition of sustainable development goals and the implementation of the underlying action programs is significant. In the three natural resource management fields—water, soil, and forests—participation by the private sector or associations is developing with more or less intensity within the scope of codes that precisely define user rights and responsibilities. Participation is significant in the management of irrigation water; involvement is increasing for forest management and is at an early stage for soil and water conservation. The breakdown of activity between the national and regional levels and between the administration and the private sector or associations is clearly defined. Participation should be generalized and become even more integrated from the start of the activities in question, as recommended by the commissions in charge of preparing the development plan. Promoting the synergy of the efforts of all the stakeholders concerned in environmental development and preservation, as well as building their management capacity and skills, should be the ultimate goals of future strategies.

⁴⁵ According to partial results from a MAEHR survey in progress (mentioned in the text), subsidies account for about two-thirds of operating expenses.

5. Analysis of Public Expenditure for Environment and Natural Resource Management

172. The preceding chapters assessed Tunisia's progress with respect to the improvement of environmental resource quality and its institutional performance in relation to the strategy set by the country after the 1992 Earth Summit. This chapter analyzes the adequacy and efficiency of public expenditure allocated to the protection of the environment and the management of natural resources in light of the priorities that the country set for itself, while taking into account constraints on execution.⁴⁶ The expenditure analysis will serve as a basis for future planning of environmental expenditure in order to achieve better harmonization between public expenditure and environmental priorities.

173. The study was conducted by analyzing the National Environmental Action Plan (NEAP), as well as the investment budgets of the Ministry of Environment and Territory Development over the 1992–2001 period, using the two latest development plans (the 8th and 9th Plans), the estimates in the 10th Plan, its budgets for 2002 and 2003, and the budgets of the affiliated departments and agencies. The study also took into account, for natural resource management, projects of the Ministry of Agriculture regarding forests, soil and water conservation, and water management, and programs and projects for water saving, quality monitoring, refilling of aquifers, and reutilization of wastewater, excluding transfer and mobilization projects (dams and wells for monitoring water table).⁴⁷ Finally, a brief analysis of World Bank projects and activities in Tunisia was conducted to identify the most important fields, in order to propose new support initiatives for environmental sustainability.

5.1 Assessment of the National Environmental Action Plan

174. Tunisia was the first country in the Middle East and North Africa region to prepare, in 1990, a national environmental action plan. The main priorities of the NEAP were to use natural resources more efficiently and to prevent environmental degradation, in view of the private sector's limited resources. The three components of the NEAP were (a) a set of 10 emergency measures in the energy, industry, wastewater management, and urban and hazardous waste sectors; (b) legal and institutional measures on the national level; and (c) measures on the sectoral level such as management of natural resources.

175. For the implementation of the plan, the NEAP proposed a budget of 430 million dinars (US\$472 million in 1990) over a five-year period, with a direct contribution by the State not exceeding 20 to 30 percent of the total cost. The main component of the investments was to be financed by financial institutions and financial backers. Figure 5.1 shows the distribution of the investments and reveals the priority that the NEAP accorded to industrial and urban pollution problems. As figure 5.2 illustrates, the priorities will be revised in a few years to reflect the priority given to soil and water conservation.

176. In 1993 the total expenditure for projects increased from 430 million to 778 million dinars, 406 million dinars of which were financially secured. New projects amounting to 71

⁴⁶ The proposed analysis of public expenditure is inspired by three general principles (see "World Bank Public Expenditure Manual," 1998): (a) fiscal system, (b) efficiency in expenditure allocation so as to highlight priorities; and (c) efficiency in use so as to reach the expected results at lower cost.

⁴⁷ Also excluded are equipment expenditures for the corresponding services, which are not determined in the overall budgets.

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million dinars were added to the NEAP, and seven projects (worth 11 million dinars) were abandoned. An initial assessment of the progress achieved (World Bank 1995a) enabled a reassessment of part of the projects and programs and a verification of the status of the grants and of the effective progress shown in figure 5.2. Since 1990, only 143 million dinars have been secured or promised, amounting to 33.4 percent of the amount planned by the financial backer. Among the reasons for the low progress rate of around 17 percent were that (a) the financing promised by international donors did not materialize, leaving a financing deficit that was not anticipated in the state budget; (b) preliminary feasibility or technical studies had not been carried out for a large number of projects retained in the plan; and (c) the institutions (except NAS) remained unable to plan and implement large-scale projects.

Figure 5.1 Summary of public expenditure by type of activity, Tunisia 1990

Figure 5.2 Revised priorities of the National Environmental Action Plan, Tunisia, 1995

Source: World Bank (1995a).

177. The projects completed or in progress as of 1995 amounted to 344 million dinars (figure 5.3).

Figure 5.3 Achievement of NEPA priorities

Source: World Bank (1995a).

178. Since this last assessment of the public expenditures within the revised NEAP, the situation is as follows:

- *Sanitation.* All 55 sanitation projects have been completed. The sewage treatment station in West Tunis, the study of which was cofinanced by the World Bank, is to be constructed through a build-operate-transfer (BOT) contract; the final design has been decided, and a second station in Naâssen will enable the re-use of wastewater.
- *Solid waste.* Progress on sanitary landfills (5 in number) cofinanced by the KfW and the EIB is well below the initial goal of 16 sanitary landfills. The program was revised; a new program that envisions 9 regional sanitary landfills, with transfers, is currently under study or subject to an invitation to tender.
- *Control of industrial pollution.* The major depollution projects such as STIR, hydrocarbons in marine environment, and South Lake of Tunis have been almost completed, except for the industrial projects (industrial zones) in Sousse and Sfax, the phosphogypsum dump in Gabes cofinanced by the EIB, and the waste muds of the Phosphate Company of Gafsa.
- *Soil conservation.* Soil conservation activities and annual programs have been completed, and new programs are underway within the scope of the 9th Plan.
- *Water quality.* The water quality projects were not completed and remain at an experimental stage. Most of them are included in the Water Sector Investment Program (WSIP), at higher costs, and should be completed by 2004 or 2005.

5.2 Assessment of development plans

179. Table 5.1 shows the investment expenditure of the last two development plans for 2002 and 2003 (projections) and the budgets of the 9th Plan, covering 2002–6 (project sheets, MDIC 2002).

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Table 5.1 Summary of public expenditure by activity or type, Tunisia, 1992–2006
(millions of dinars)

	8 th Plan 1992-1996	9 th Plan 1997-2001	Change 8 th to 9 th	Budgets 2002-03	Plan 2002-2006	Change 9 th to 10 th
Forests	177.1	260.7	+47%	63.6	309.0	+19%
Soils	94.5	152.6	+62%	67.3	228.0	+49%
Water (resource management) ⁽¹⁾	20.7	75.8	+266%	85.8	127.4	+68%
Biodiversity	1.1	5.0	+353%	9.4	23.2	+364%
Coastal Protection	0.1	6.0	+7 430%	0.6	21.5	+257%
Sanitation	239.1	387.0	+62%	210.0	523.3	+35%
Industrial Pollution ⁽²⁾	59.6	82.8	+39%	1.0	3.7	-96%
Waste Management ⁽⁵⁾	2.5	14.9	+505%	2.0	58.6	+293%
New energies ⁽³⁾	4.2	19.8	+368%	1.9	25.9	+31%
Land use planning	2.8	2.5	-10%	0.5	8.3	+227%
Cities Development	4.6	16.7	+268%	6.0	19.5	+17%
	606.3	1024.0	+69%	448.2	1348.4	+32%
General studies and researches	0.2	2.5	+1 555%	1.3	7.0	+182%
Awareness and information	2.9	5.3	+80%	2.0	4.5	-15%
Services improvement ⁽⁴⁾	5.0	17.6	+253%	2.0	1.8	-90%
Miscellaneous	1.4	1.6	+16%	1.5	s.o.	
Subsidies and private projects	2.5	0.9	-65%	0.8	s.o.	
	11.9	27.8	+133%	7.6	13.3	-52%
General total	618.2	1051.9	+70%	455.9	1361.7	+29%
Average per year	123.6	210.4	+70%	227.9	272.3	+29%
Average per year (value 1991)	107.0	148.2	+39%	145.1	165.9	+12%
Real annual increase			+6,74%			+2.28%

⁽¹⁾ Estimated on the basis of planned projects (e. p. WSIP)

⁽²⁾ Without FODEP assistance

⁽³⁾ Off STEG projects (wind energy)

⁽⁴⁾ Excluding agriculture services (global) and the two transferred agencies

⁽⁵⁾ The 10th Plan includes the project of 9 dumps (42.4 MD plus the hazardous waste treatment station (15MD)

180. Figure 5.4 shows the progress of investments by sector.

Figure 5.4 Environmental investments by sector, 1992–2006

181. During the years 1992–2001, expenditure was distributed as follows:

- Public investments of 1.67 billion dinars, of which 664 million dinars (39.7 percent) are financed by loans and by bilateral and multilateral grants. Priority in investments was given to sanitation, followed by forestry, soil, and water. These investment priorities reflect the environmental priorities for the reduction of water pollution; the control of erosion through forestation; soil conservation; and expansion of access to drinking water. The harmonization among environmental and financial priorities is consistent with sustainable development principles.
- Six main mechanisms of Treasury funds management or subsidies to private initiatives, for a total amount of 288.7 million dinars, or 13.7 percent of total expenditure. The mechanisms included three funds—FODEP for industrial pollution, TZEPE for sanitation and cleanup of tourist zones, and PEMF for collection activities and valorization of packaging wastes—and three types of subsidies to private equipment for irrigation water savings, soil and water conservation, and energy-saving actions.
- Operational budgets financed by the state amounting to 143.9 million dinars, or 6.8 percent of public expenditure. These budgets are in addition to the fees and costs recovered by public institutions.

5.3 Environmental expenditure

182. Tables A5.1–5.3 in the Annex show detailed public expenditures, their breakdown by operator and type of intervention, and the various supporting funds. Public expenditure, broken down by budget category, is summarized in table 5.2.

Table 5.2 Environmental expenditure, 8th and 9th Development Plans, Tunisia

(million of current dinars, unless otherwise specified)

Type of expenditure	8th Plan (1992–96)	9th Plan (1997–2001)	Total (1992–2001)	Real average progress per year (percent, in constant dinars)
Investment	615.7 ^a	1,051.0 ^b	1,666.7	+6.81
Subsidies and funds	44.3	244.4	288.7	+35.1
Operations ^c	50.8	93.1	143.9	+8.34
Total	710.8	1,388.5	2,099.3	+9.73
As percentage of gross national product (GNP)	0.95	1.14	1.07	+20 /5 years
As percentage of gross domestic product (GDP)	0.89	1.12	1.03	+26 /5 years

a. Total budget (618.2 dinars, less 2.5 million dinars transferred to FODEP for subsidies to industry).

b. Total budget (0.9 dinars of subsidies).

c. Not included in the operating budgets of NAS, which are supposed to be covered by fees (actually, depreciation and loan interest are not covered) and the part allocated to SONEDE and STEG for their current activities of water and energy savings and promotion of renewable energy.

183. Expenditure allocated for environment and natural resource management represents 26 percent of GDP; after deduction of subsidies, such expenditure is expected to increase by 11.4 percent, for a relative growth of 2.1 percent a year. Resources allocated for the management of natural resources (forests, soils, water, biodiversity, and coastal) and

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estimated at around 500 million dinars within the scope of the 9th Plan are slightly higher than the resources allocated for environmental protection (the fight against water, air, and solid waste pollution), estimated at 484.7 million dinars. Resource management shows a relative increase from one plan period to another at the expense of environmental protection (table 5.3).

Table 5.3 Breakdown of financial resources, 8th, 9th, and 10th Development Plans, Tunisia
(percentage)

	8th Plan	9th Plan	10th Plan
Natural resource management	47	48	52
Environmental protection	49	46	43
Other	4	6	5

184. To illustrate the importance accorded by Tunisia to the environment, figure 5.5 presents a comparison with selected European countries according to GDP per capita and environmental investment as a share of GDP. For 1999, Tunisia's GDP per capita denominated in Euros was approximately US\$2,200, and public environmental investment (excluding operations) was 1.03 percent (see table A5.1 in the Annex).

Figure 5.5 GDP per capita and environmental investments, selected countries, 1999

Note: Compared with the countries on the left-hand side of the figure (Eastern European and Central Asian countries with GDP per capita or 1,800–2,000 euros, similar to Tunisia's), Tunisia is above Hungary and the Baltic states and 40 percent below the Czech Republic and Poland.

Source: OECD, background paper, EECCA Environment Strategy, EAP Task Force.

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185. Table 5.4 compares the projections of the development plans and disbursements from the budget for some well-defined fields.⁴⁸

Table 5.4 Projections and disbursements of environmental investments, 8th and 9th Development Plans, Tunisia
(millions of dinars)

Sector and status of investment	8th Plan	9th Plan
<i>Forests</i>		
Projected	195.3	294.6
Disbursed	177.1	260.7
Progress rate (percent)	90.7	88.5
<i>Water and soil conservation</i>		
Projected	222.8	243.9
Disbursed	94.5	151.4
Progress rate (percent)	42.4	62.1
<i>Sanitation</i>		
Projected	424.2	566.2
Disbursed	239.1	387
Progress rate (percent)	56.4	68.4

186. One reason for the low disbursement rates is that annual budget allocations are often less than the five-year forecast. The programs and projects proposed during the preparation stage of the development plans (or for the NEAP in 1990) were probably too ambitious and too comprehensive. The time required for implementation, the technical means, and the implementation constraints on projects and programs are often underestimated even when financing is ensured. The main causes of delays and postponements are:

- The modifications introduced between the preliminary definition of the project and the detailed feasibility and design studies
- For some infrastructure projects (sewage treatment stations and dumps, among others), the availability and selection of implementation areas
- The actual time required, which is almost always longer than expected, for technical studies and concluding deals with companies
- Less frequently, but generally involving significant amounts, the questioning of the project itself and perhaps its cancellation.

187. On the basis of the analysis of this expenditure, some observations can be made:

- If, for purposes of the analysis, environmental degradation costs in Tunisia in 1999 are estimated at 522 million dinars, or 2.1 percent of GDP, public expenditure appears to represent half of the costs of environmental damages (1.1 percent of GDP; see chapter 2).⁴⁹ It is perhaps thanks to these investments that the damage costs (considered as lost benefits) are low. Moreover, it seems that the allocation of public

⁴⁸ The structure of the plan projections is not systematically the same as that of the budgets except for some ministries and the recent plan; denominations in such cases do not exactly match.

⁴⁹ The cost cited does not include global environmental costs.

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expenditure encourages the management of natural resources. This trend is reflected in annual damage costs. As shown in figure 5.6, the impact of environmental degradation on natural resources is significant, equivalent to about 0.85 percent of GDP.⁵⁰ This confirms the necessity to allocate a significant share of the state budget for preservation of the environment. It is, however, recommended that a marginal analysis be conducted to identify the types of intervention that would generate higher benefits at reduced cost. The preparation of such an analysis is one of the proposed recommendations.

- The allocation of investments averaging 1 percent of GDP reflects the importance accorded by the Tunisian Government to the protection of the environment and the preservation of its natural resources. The establishment of financial instruments, in the form of special funds, and of incentive mechanisms, in the form of subsidies, are important in the short and middle terms for maintaining and generating additional financing for the proposed investments. But, as noted in chapter 4, the proliferation of these mechanisms could interfere with the efficient allocation of resources and delay fiscal reforms aimed at integrating investments and operating budget costs into the state's public expenditure.
- The NEAP envisioned state participation of 20 to 30 percent of project costs, on the assumption that the NEAP would be financed mainly by external resources, but this rate was largely exceeded. The resort to external financing for 40 percent of investments and the continuation of subsidies may put in question the sustainability of these investments in case financing in the form of subsidized loans or grants decreases in the future. This would jeopardize the privatization process, given the lack of integrated program planning and the absence of cost accounting on the level of projects and programs. Significant efforts are needed to coordinate external financing within the scope of integrated planning on both strategic and project levels.

Figure 5.6 Annual average costs of damage by economic category, Tunisia, 1999
(percentage of GDP)

Source: World Bank data.

⁵⁰ This estimate of natural resource degradation is not comprehensive because of difficulties linked to the monetary assessment of some impacts. If the effects of the loss in terms of biodiversity and ecological function of forests and the impact of water pollution on natural ecosystems could have been quantified on the monetary level, the impact of environmental degradation on natural resources would have been higher.

5.4 The role of the World Bank

188. Tunisia was the first country in the Middle East and North Africa region to benefit from a Bank-backed assistance and cooperation program, on both strategic and operational levels, for the protection of its environment and conservation of its natural resources. On the strategic level, Tunisia was the first country to integrate the environmental dimension, in the 1996 economic memorandum as well as in the Country Assistance Strategy (CAS, World Bank 2000). These two documents included specific chapters on the environment, with an environmental analysis matrix describing the objectives and impact of environment policies, programs, and projects. The documents also stressed the need to address the problems of soil degradation, water scarcity, and wastewater treatment, as well as coastal degradation due to tourism development. These problems remain a priority and are the subjects of recommendations in chapter 6.

189. As described earlier, with the assistance of the World Bank and other financial institutions such as the EIB, the GTZ, and the KfW, Tunisia made considerable progress in terms of institutional development and effective policies on environmental protection. Bank assistance specifically focused on:

- Improving analytical capability with respect to environmental planning such as the preparation of the NEAP in 1990; the review of the NEAP in 1995; the preparation, in the context of preparation of the 9th Plan, of a strategic study on natural resources and a sector planning model for agriculture (ARAMTUN); and, more recently, analysis of environmental degradation costs for 1999.
- Conducting sectoral economic studies in the fields of natural resources, agriculture, and sanitation and water supply. These studies included an environmental component prepared within the scope of project preparation.
- Cofinancing environmental projects in the fields of water and sanitation, transport, forestry and natural resources, and municipal development, as well as environmental projects financed by the Global Environment Facility (GEF);
- Benefiting from the METAP regional program, to move forward with the dialogue in the fields of waste, EIA, control of industrial and marine pollution, and the linkage between trade and environment.

a. Current World Bank projects

190. Twenty-two projects are being financed by the Bank, of which 19, totaling US\$1.23 billion, are in the form of loans and 3, amounting to US\$13.9 million, are financed by the GEF and the Ozone Layer Protection Program of the Montreal Protocol. Technical assistance projects financed by METAP are estimated at US\$1.56 million. These projects, along with their goals and indicators, are described in tables 5.8–5.9 in the Annex to Chapter 5.

191. Fifteen of the twenty-two projects accounting for US\$577.8, or 46.9 percent of the total, are for, primarily, municipal development (US\$157.0 million), followed by agriculture and irrigation (US\$124.3 million), water and sanitation (US\$118 million), transport (US\$65.3 million), natural resource management (US\$65.3 million), cultural heritage (US\$17.1 million) and global environment (US\$8.53 million); see figure 5.7.

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Figure 5.7 Financing of World Bank Environmental Projects, Tunisia

Source: World Bank data.

192. Of the 15 projects, 6 projects, totaling US\$325.5 million, include environmental components which, according to World Bank project codes, account for an estimated US\$87.2 million, or 7 percent of the Bank loan amount as shown in figure 5.8. (See also table 5.8 in the Annex to Chapter 5.)

Figure 5.8 Global Environment Fund (GEF) credits and World Bank loans, Tunisia

Source: World Bank data.

193. The most recent operations that include environmental components are the project for the development of the Northwest Mountain Projects (FY 2003) and the Water Sector Investment Loan (WSIL, fiscal 2000). This latter project aims at promoting integrated management of water and soil conservation. None of these projects has indicators based on environmental or health impacts or benefits. Rather the indicators stress such outcomes as number of inhabitants having access to drinking water, sanitation systems, and roads. The Greater Tunis Water and Waste Water Project (FY 1995) could not, for the technical reasons mentioned in chapter 3, assess investments allocated for Tunis wastewater. It is expected, however, that most of these projects will have environmental and institutional impacts within the scope of implementation of environmental management plans.

194. All of the projects were carried out in a traditional manner and were geared toward a financial and technical perspective without integrating the environmental dimension in their design. It is worth mentioning that the Bank's investments are not consistent with Tunisia's environmental priorities but instead support the priorities of the investment plans. Moreover, except for the projects financed by the GEF and METAP, Tunisia did not deem it necessary to borrow funds for financing environmental projects, since it could obtain concessionary loans from the EIB, the GTZ, and the KfW. Unfortunately, the Bank's operational portfolio for fiscal 2004–6 includes only one operation financed by the GEF, for the preservation of marine biodiversity in the Gulf of Gabes (US\$6.2 million), and two operations for FY 2006 for drinking water supply in urban areas (US\$70 million) and the management of natural resources (US\$20 million).

b. METAP activities managed by the World Bank

195. Tunisia has been the greatest beneficiary of the METAP regional program. During the past 10 years, it received grants totaling US\$2.46 million, of which US\$1.56 million was allocated during the 1998–2003 period (see table A5.5 in the Annex). Some recommendations included in the studies, on natural resources, control of industrial pollution, and protection of costal lagoons and coastal areas, have been adopted. Others, such as the feasibility study for a public-private partnership for the collection and valorization of plastic packaging, were not implemented, due to the lack of a public investor.

196. In 2001 METAP restructured its technical assistance approach according to three main elements: management of water quality and coastal areas; municipal and hazardous waste; and environmental policy instruments (environmental protection, environment and trade, and environment and economy). The activities for each element or sub-element would be implemented by national institutions in the region, which would offer technical support and training to all countries benefiting from METAP. Tunisia was selected to manage the municipal waste element. It accordingly created within NEPA, a regional management group to implement the Regional Solid Waste Management Project for the Mashreq and Maghreb countries financed by METAP through a grant of 5.0 million euros from the European Commission's Short- and Medium-Term Priority Environmental Action Program (SMAP II). ICETT also established a regional center for environmental impact assessment, with the assistance of a US\$440,000 grant from the World Bank's Development Fund.

Conclusion

197. The analysis of public expenditure reflects the financial importance accorded by Tunisia to implementing its NEAP and remedying serious environmental problems. Indeed, during the past 10 years, Tunisia's public expenditure for the management of the environment and natural resources represented 1.03 percent of its GDP. This percentage is similar to that observed in some European countries. Moreover, Tunisia continues to use public funds to subsidize environmental protection. In the short and middle terms these subsidies should be justified on the basis of precise public goods and should be limited in volume and duration. In

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the long term the subsidies might reduce the public sector budget available for addressing other priority programs, in particular in the education and health sectors.

198. To complete its environmental transition, Tunisia must begin developing an efficient environmental financing system based on the polluter-pays principle. This requires a greater effort in terms of control and monitoring, incentives to attract private financing and the financial market, and a stronger role for civil society. Given its global experience, the World Bank should be able to assist Tunisia in establishing the basis for such a financial system while continuing to integrate the environmental dimension into all of the financed operations.

6. Priority Goals and Suggested Options

199. Having opted for an opening of its economy to the global market, Tunisia must face the liberalization of trade and greater international competition. This could be achieved by further activating its private sector, building its human capacities, and consolidating the sustainable management of its environment and natural resources within the scope of a comprehensive governance characterized by a deepening of economic reforms and an increased role for the private sector and civil society in the development process. This is the main message that can be deduced from Tunisia's participation and commitments in the Johannesburg process. It is within this context that this study, based on an objective diagnosis, casts new light and makes concrete proposals to help Tunisia refine its sustainable development strategy.

6.1 Performance of current environmental policies

200. Three general conclusions emerge from the diagnosis and analyses developed in the preceding chapters:

- The institutional and political framework in place since the end of the 1980s served very well the needs of the period of opening and economic adjustment and the improvement of the standards of living of the Tunisian population. Under the impulse of well-financed, centralized, politically strong institutions, significant progress was achieved, in particular in the mobilization of water resources, soil and water conservation, and free access to drinking water, sanitation, and energy, as well as in the development of cost recovery instruments and financial incentives.
- The intensive use of natural resources (water, soil, and coastal resources) is the weak link in Tunisia's sustainable development chain.
- The institutional and political framework must rapidly adapt to the needs of a new phase characterized by: a competitive job-generating economy in which the private sector plays an essential role; the use of incentive mechanisms that strengthen the efficiency of public expenditure, the recovery of resources and services costs, and the integration of environmental degradation costs; better integration of economic growth and sustainable management objectives; and, simultaneously, better cross-sectoral coordination and an increased role for municipalities, other local entities, and civil society in the management of environmental problems on the regional and local levels.

Limitations of environmental policies

201. The diagnosis carried out in this study shows the limitations of the current environmental and natural resource management policies:

- The environment policies, whether direct or indirect, are in fact sector policies, and are independent of one another.
- Qualitative and quantitative appraisals of impacts on the environment and natural resources are generally well documented on the technical level, with the exception of the impacts related to soils and water, which needs further information and forecasts. Economic assessments of such impacts, however, are almost nonexistent.

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- Mitigation programs and the institutes in charge of implementing such programs are generally well defined and structured, even though specific improvements are needed.
- Efficient economic and financial instruments for the specific purposes have been developed in some fields (water pricing, and energy and water savings) but are lacking in others such as soil conservation and management of water quality. Such instruments are not integrated into comprehensive policies, which take into account all the effects of development policies.
- Integrated pollution control principles that apply the polluter-pays principle or producer recycling have been defined but are poorly implemented.
- The instruments that have been developed have not yet deeply affected production and consumption habits. The behavior of industrialists, developers, and the public remains unchanged, and positive or negative financial sanctions remain the best awareness tools and incentives for change.

Efficiency of public expenditure

202. It appears from the analysis in chapter 5 that the financial means allocated by public authorities which have increased significantly (26 percent increase of their share in the GDP over five years) do not constitute a constraint. This is because the international financing in the form of credits or sometimes direct grants or debt restructuring were available. During the first years of development of sectoral environmental policies, human capacities to carry out the investments and expenditures may have been lacking, but a significant improvement has been witnessed during the past five years. Thus, recent disbursements almost match the scheduled programs. The main problem evident from the analysis of the allocated budgets is that they are geared toward two types of expenditure: (a) investments, which fall, by their nature, within the prerogatives and responsibilities of the public authorities, and (b) subsidies to private or public enterprises, farmers, and individuals, who make a meager contribution to the environment in comparison with the costs they generate.

Impact of social and economic policies

203. The preceding chapters clearly demonstrated that environmental degradation (except for soil degradation) might be reversible but that it is linked to the socio-economic development process in the country. Despite the massive investments in physical and human development, the main obstacles to sustainable development are related to social, institutional, and economic policy. These are:

- The need to achieve food security objectives through (a) the selection of crop methods and agricultural products that are appropriate for the local market but may cause water and soil degradation, and (b) direct subsidies and price compensation extended without due consideration of the negative impacts on natural resources, which remain unknown.
- The priority given to investments aimed first of all at improving living conditions in urban areas and the lack of investments and institutions for the improvement of living conditions in rural areas.
- The “sectorization” of the decision-making process; environmental issues fall only within the competence of the country’s environmental authorities and are considered merely advisory issues. This is because of the absence of horizontal integration and perspectives and precise accountability of existing institutions for reaching general sustainable development goals.
- The weak awareness and participation of populations, users, and the private sector in the decision-making process.

6.2 Priority themes emerging from the CEA

204. *General framework.* The solutions aimed at remedying the constraints and limitations must be based on the social, institutional, and economic reforms suggested by Tunisia within the scope of the sustainable development policy it undertook to implement in Johannesburg. This policy includes all of the fields of environmental protection and natural resource management, as well as all sectoral development policies. It may be summarized as follows:

- Improve capacities to anticipate change and strategies concerning globalization
- Increase coordination and synergy among economic development and sustainable development policies.
- Develop tools for better integration of environmental costs and benefits into development (economic simulations and modeling).
- Ensure better mobilization of international cooperation in favor of sustainable development.
- Improve governance on the local level and the participation of Tunisian civil society.
- Develop new information systems for the decision-making process and the monitoring of results and impact.

205. *The priority themes.* By deciding to invest in sustainable development, Tunisia intends to give a leading place to environmental, social, and economic aspects. To give tangible content to this sustainable development policy and implement its priority elements, the analysis in the preceding chapters emphasize two priority goals, selected according to (a) their long-term cumulative effects; (b) their potential to contribute to sustainable development principles; (c) their expected outcomes in terms of minimization of the costs of environmental resource degradation; and (d) the state of progress toward strategic goals and policies, as summarized in table A6.1 in the Annex.

206. The two priority goals are (a) integrated conservation of soil and water and improvement of their productivity and (b) the improvement of the quality of economic growth on the Tunisian coast.

207. It is understood that other fields, such as improvement of citizens' health and quality of life, can also meet the above criteria. The Tunisian Government does, however, have a continuous investment policy for access to drinking water and sanitation, as well as for the improvement of air quality in major cities and industrial zones (such as Sfax and Gabes), which may reduce the long-term cumulative effect on the environment

208. The two proposed goals are only the beginning of a process of integrating the environmental dimension in these fields on the basis of the sustainable development policy orientations presented at the Johannesburg summit. The sub-goals, which are consistent with these orientations, are presented in table A6.2 in the Annex. A similar table may be developed for other fields, once the expected outcomes for each sub-goal are tested and a monitoring process is implemented to ensure its sustainability.

209. For the two themes identified as priorities by this study, the approach proposed by the government of Tunisia should, according to the orientations of its future policies, be materialized in the long term through the achievement of the sub-goals outlined below and will mainly rely on institutional and supporting measures. Institutional measures range from the formulation of policies to the adaptation of existing tariffs (for irrigation water, for instance) and the development of economic instruments for environmental management, such as environmental taxation, and supporting measures such as the development of the efficient information systems necessary to enable progressive achievement of the expected outcomes.

a. Integrated conservation of water and soil and improvement of their productivity

210. Sectoral agricultural development strategies are mainly focused on expansion of arable area, capacity building, and improved profitability; they hardly integrate the effects of competition among products and the required complementarities at the level of the farm. They do not integrate, or barely integrate, impacts on resources, since these are still poorly known, if only qualitatively. The realization of this goal requires the development of an integrated soil and water integrated policy with the following sub-goals:

- Integrate soil and water conservation concerns while taking into account the country's biological diversity in development strategies, within a sustainable development perspective.
- Assess the impact of achievements in terms of soil and water conservation both for large-scale interventions and for interventions on the farm level; encourage the adoption of antierosion techniques by strengthening awareness and simplifying concepts for the public; and further develop an integrated and territorial approach.
- Carry out a predictive comparative assessment of subsidies to water savings and the possible impacts on the soil and on the profitability and quality (value added and export potential) of irrigated products.
- Assess the impacts of future changes in price and subsidy policies on soil use and diversification of cultivation.
- Develop continuous monitoring systems for natural resources (such as a Water and Soil Observatory).
- Encourage the effective participation of farmers' groups in the policies and choices concerning the development of their activities and create conditions for better involvement of users in the management of their resources.

211. The expected middle- and long-term expected outcomes are:

- Equilibrium in the long term between the priorities of water-consuming agricultural development and soil resources
- Economic optimization of land productivity
- Readjustment of programs and levels of investments in soil and water conservation
- Adaptation of anti-erosion techniques for efficient utilization by small farmers
- Long-term projections of the real margins of the estimates according to area (land capability maps, detailed soil maps), integrating the production value added and consumption (quantity and quality) of water and soil resources
- Determination of the production methods and types of farm that should be directed toward other products through targeted subsidies
- Changes induced in soil cultivation methods to maintain the quality required by potential clients
- Development of systems for measuring the status of soils and water (already started under WSIL), as a basis for the scientific interpretation of simulated future development
- Availability for every user of all the information and data on the types and quality of soils and water, as well as the constraints and incentives
- Approval by farmers' groups for development projects that are satisfactory in terms of revenues and resource preservation, with possible compensation for temporary loss of profit

b. Improvement of the quality of economic growth on the Tunisian coastal zone

212. It is not enough to improve natural capital through the enhancement of agricultural and rural policies, without paying particular attention to the social and environmental aspects of the Tunisian coast. The coast is home to more than 65 percent of the Tunisian population and is the site of many heavy and polluting industries. At the same time, it is a source of financial revenues, with more than 5 million tourists per year, a number that is constantly increasing, except under exceptional circumstances. The major concern is the protection and improvement of the coastal environment, whose fragility and degradation are the direct consequences of incomplete control of the effects of increasing urbanization in coastal agglomerations. The indirect effects, mainly related to waste management, have a potential negative impact on this environment.

213. The effects of tourism development on the demographic and urban development of the coast, which may be aggravated when added to the impacts of industry, transport, and so on, are unknown or are simply noted and remedied after the fact. The natural and human environments that support such activities may be altered in an uncontrolled way when admissible tolerance thresholds are not respected.

214. The tourism development strategy (a project financed by the World Bank) emphasizes environmental aspects: beach quality and cleanliness, quality of bathing water, landscapes, and occupation density. The three sub-goals are to:

- Ensure the equilibrium between the quantitative growth of tourism and preservation of coastal quality
- Improve tourism profits by ensuring to targeted clients a quality environment and ecology-based tourism products for meeting their expectations
- Develop institutional and regulatory tools for integrated management of coastal areas.

215. The expected outcomes are:

- The determination of the maximum absorptive capacities (the tolerance threshold) of tourism activities given other constraints and projects, through strategic environmental studies
- The determination of economic optimums encompassing the expected value added of a better quality of the general environment
- Mainstreaming of tourism planning into the land use and coastal cities development plans.

216. Tunisia's increasing economic prosperity implies an undesirable increase in the production of solid waste, which often equals the GDP growth rate; that is, 2 to 5 percent per year. How to manage this rapid increase of waste has not been deeply analyzed. The financial and institutional solutions applied in other countries may not be implementable without adaptation to local requirements. An optimal solution for sustainable management aims at improving the means already used, which are economical and may be realized within the local context. In the future, the quantity of waste is expected to increase, given population and consumption growth. The composition of waste will reflect the growth of general welfare, with an increase in packaging waste. This development will require significant investments related to the transfer and dumping process to enable, within 10 years, the final disposal of ultimate waste. Within this investment cycle, rapid adaptation to modern technical and environmental standards may be facilitated by private sector technical know-how. A general goal would be the definition of all possible actions so as to reach a sustainable situation on

both the technical level (operations entrusted to professionals) and the financial level (availability and adequacy of resources) regarding integrated management of municipal waste.

217. The sub-goals are to:

- Clarify the roles of the public authorities, as well as the financial costs for integrated management of municipal and other waste.
- Set efficient market rules and direct technical development through the private sector.
- Develop inter-communality and raise the awareness of city dwellers and industrialists as to the financial implications of their behavior.

218. The expected outcomes are:

- Formation of district groups to delineate appropriate regions for the optimal organization of waste collection
- Guarantee of market deals on the basis of the districts' solvency; establishment of a regulation system for market deals
- Introduction of cost accounting in major districts
- Definition of a pricing system based on total costs and propensity to pay of users (household and companies).

6.3 Suggested reforms for sustainable management of the environment

219. The detailed analysis of performance in this study, and the conclusions and priorities that emerge from it, clearly demonstrate that the main efforts that should be made by Tunisia to reach the goals set within the scope of the 10th Development Plan (2002–6) and the 10-year perspectives (horizon 2010) are in the political and institutional fields.

a .On the policy level

- *Progressive reorientation of the policy of intensive exploitation of natural resources*, within the scope of agricultural production and mobilization of water resources, on the basis of criteria that explicitly include economic performance and resource degradation and scarcity. This would enable better valorization of resources and improvement of the competitive capacity of farms equipped with good production inputs, as well as conversion of marginally performing farms in ecologically fragile areas.
- *Adoption of a pricing policy (for water, energy, and municipal services) that would enable the recovery of long-term investment, maintenance, and operation costs*. This is particularly important for water resources in agriculture, where the price today hardly covers 10 percent of the total cost of production. The price should rapidly reach the real cost of production, including the cost of equipment of irrigated areas, to ensure both the sector's competitiveness and rational exploitation of water resources. Under this new pricing policy, NAS (which has not increased sanitation prices since 1998) should be able to reduce its dependence on state budget subsidies.
- *Adoption of a policy for the acceleration of the transfer of water resource management to irrigators*; consideration of next steps beyond the binominal pricing system for the introduction of market mechanisms into water management.
- *Adoption of a solid waste cost recovery policy*, beginning with implementation of the current tariffs (which require the districts to pay 5.15 dinars per ton); progressively pass the entirety of the operating cost (which can reach 9.2 dinars per ton) to districts and citizens, with the eventual aim of recovering the total cost, from collection to disposal, which is 55 dinars per ton.
- *Promotion of financing and incentive-adapted mechanisms*.

b. On the institutional level.

220. The objectives are to streamline the roles of the various institutions, to integrate their functions so as to avoid clustering and overlaps, and to make sure that the entire institutional body, on the basis of a shared vision, contributes to the achievement of Tunisia sustainability goals. Four actions are recommended.

(i) Re-alignment of environmental institutions.

221. The implementation of the sectoral strategies and policies requires the adjustment of certain environmental institutions: NEPA, NAS, the NACP, the NREA, and ICETT.

The NEPA, as regulatory agency, should focus on the following main fields:

- The understanding and assessment of the environment and its impact on health and on natural capital degradation so that NEPA can participate in decision-making on the basis of precise and regular information and data. An understanding of the environment will help in revising norms and standards so that they do not constitute a constraint on investments and will enable the promotion of the roles of the market and the private sector.
- Environmental prevention, by strengthening the EIA system so that intervention occurs both upstream in the decision-making process, to enhance the design of the project and its sustainability, and downstream, where a system should be established to monitor environmental management plans. Environmental protection should go beyond the projects to encompass strategic and sectoral assessments and to serve as an analytical tool for the formulation of sectoral and cross-sectoral policies.
- Integrated pollution control, as defined in the EU directive, with the establishment of environmental permits; prevention and monitoring of all of aspects of pollution (air, water, and solid waste) and the attainment of the lower level of pollution within tolerable limits. Pollution monitoring and control can be efficient only if local environmental agencies are reinforced and if performance contracts between companies and NEPA and its local agencies are negotiated fairly, in a way that enables the operator to reduce pollution according to an acceptable schedule while allowing integration of depollution costs.
- Progressive application of the polluter-pays principle (PPP), as defined by the OECD, according to which the polluter should bear the total cost consistent with the limits set by the competent administration, but *without subsidies*. This would require the development of fiscal and pricing tools to prevent pollution or the misuse of natural resources. The FODEP may be the efficient environment financing system, with the PPP as a basis.

222. It is strongly recommended that NEPA, in focusing on its main tasks, transfer public garden and park management and beautification of avenues and roads to the relevant municipalities. Similarly, NEPA and NAS should be released from the functions that place them in a situation of being both judge and involved party, in particular regarding the management of municipal solid waste and, for NAS, the control of water pollution. The future responsibility for the management of the sanitary landfills currently controlled by NAS and NEPA is still under study. Transfer should take place progressively to establish an inter-communality system in accordance with the law governing districts and thus develop the municipalities' accountability. It is clear, however, that NEPA has acquired considerable experience in waste management and has qualified personnel whose services will be essential in establishing any sustainable management system, whether through an inter-communality system or through the municipalities themselves. Accordingly, the waste department within NEPA will retain its public service functions of regulation, formulation and monitoring of

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policies and programs, and technical training and information. It should also participate in studies, research, and demonstration projects by disseminating scientific and technical information and assisting in the implementation of awareness and information programs. It should provide technical assistance to local collectivities in the field of waste management and in establishing a database.

223. Similarly, the mandates of the NACP and the NREA should be clarified within the scope of their affiliation with new supervising ministries. This transfer may help anchor the environmental dimension within the Ministry of Equipment, Housing, and Land Use Development (MEHLUD) through the General Directorate of Land Use Development and the NACP, and within the Ministry of Industry and Energy (MIE) through the NREA. It is important to take advantage of this new affiliation to enable the NACP to play a regulatory and coastal developer role, under the supervision of the MAEHR, to integrate the environmental dimension into town planning and tourism policies. This approach may apply to the air pollution control function of the NREA with respect to establishing linkages between the environment and energy, thus affecting energy policies.

224. ICETT, as the main training center for environmental technologies, should adapt its training programs to promote the environmental dimension within the services of public works, municipalities, and the private sector. Its role is essential in developing training courses on integrated water and soil management, waste technologies, and water quality. Its certified laboratories should serve as reference laboratories in the field of quality of industrial water and wastewater. While confirming and extending its regional mission, which consists of training on EIA, ICETT should acquire new training capacities in the field of environment economics and strategic environmental assessment methodologies so that it can train executive staff in this field.

225. Integrated waste management should, in the long run, be progressively transferred to local authorities (municipalities, unions, etc.) with or without delegation of management to private companies. It is recommended that management transfer be promoted, when and where possible, through the “design, build, and operate” system, as a preferred means of developing efficient public-private partnerships for waste management.

226. TOESD’s capacities in the fields of information systems (GIS), impact assessments, and, in particular, economic impact should be strengthened. In parallel, the role and capacities of the environment administration on the central, regional, and local levels should be reinforced and geared toward the promotion of approaches and programming tools in priority fields.

(ii) Establishment of a system of coordination.

227. Refocusing and adjustment of the environmental agencies’ functions are not in themselves sufficient to ensure cross-sectorality and cooperation between ministries. A horizontal system should be developed for a comprehensive and integrated perspective on sustainable development and the environment. It is strongly recommended that the actions of existing commissions, councils, and committees be supported by a permanent structure, with permanent material and human resources and an independent budget, within the office of the state secretary for environment in MAEHR. This body would centralize all the information sources and the technical and scientific expertise in the same department or in relevant external departments—Industry and Energy, Transport, Local Development, and Equipment and Land Use Development. This structure, which would be a department (or a permanent group) for formulating policies and monitoring sustainable development, may be on the Cabinet level. In the first stage, it should centralize the actions of the various observatories and directorates within MAEHR and its affiliated agencies that are equipped with monitoring and observation means (ONAGRI, TOESD, NAS, CADRIN, and others).

228. Once established, this structure should:

- Define and validate continuous exchange and cooperation protocols with other external information sources such as the National Observatory for Energy and municipal databases.
- Extend its activity for the conduct or steering of strategic, economic, and scientific studies on cross-sectoral themes such as trade and environment, environment and health, and environment and energy or on general themes such as development, environment, and sustainability, stressing causes and impacts and playing the role of a consultant recognized by all departments and entities whose actions may concern environmental issues (linkages between GD/EGTH, GD/EDA, and directorates of the former Ministry of Environment).
- Develop expertise in environmental policies and assessment of costs and benefits, as well as in environment economics; offer consultancy services regarding the methods and means of integrating this aspect into sectoral development strategies and programs.

229. The position and the possible relationships of this structure (permanent group of review, analysis, and studies on sustainable development) are shown in the Annex to Chapter 6. This structure would be a technical counterpart of the NSDC, with MAEHR as secretariat.

(iii) Modification of the regulatory and legal framework.

230. The integration of environmental policies into sectoral development strategies, and Tunisia's opening toward globalization, in particular within the context of its Association Agreement with the EU, necessitate a modification of the environmental legal framework. Law 91 on environmental protection (1988) as amended in 1992 by law 125, should be modified to better reconcile environment with sustainable development. It should introduce preventive action, the precautionary and polluter-pays principles, integrated pollution control, self-regulation, and self-monitoring; recognize the need to develop economic and financial instruments; and provide general orientations to encourage information and public participation. Within this context, the Water Code should be modified to protect groundwater and determine groundwater quality standards. A consistent and realistic waste standard system for industrial and municipal wastewater should be defined to facilitate control and monitoring.

231. Decree 91-362, on impact assessments, requires revision for the integrated protection of the various environments. For project EIAs, the procedure should include the necessity for a public consultation, from project identification and localization to the finalization of the EIA report. Access to these reports should be free, and the reports should be put at the disposal of the NGOs and concerned persons or persons who might bring inputs to the project. It is also recommended that the content of the EIA reports be reviewed, stressing the identification of project alternatives, transboundary and global impacts, development of an environmental management plan, and pollution monitoring and control measures.

232. Strategic environmental assessments (SEAs), which focus on sectoral and regional aspects and economic policies, should be used in a more systematic way as analytical tools for addressing complex environmental problems and integrating environmental considerations upstream in the decision-making process and sectoral planning. Five main SEAs will be needed to ensure the integration of the environment into sectoral and cross-sectoral policies

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deemed essential in this report:

- *Water sector.* Impacts of water subsidies on the export of intensive water-consuming agricultural products, as well as the equilibrium between the export of subsidized water in the form of agricultural products and the sustainable management of this resource.
- *Soil and water sector.* Impacts of water savings and the intensive utilization of mobilizable resource strategies on soil salinity in irrigated perimeters and on the long-term productivity of these areas, as well as the impacts of climate change on soil and water.
- *Agriculture.* Dry land agricultural development policies relating to soil protection and the fight against erosion through a progressive adaptation of cultivation to the land capability and weaknesses. This requires thinking about implicit or direct subsidies and how to preserve farmers' revenues during the conversion or adaptation period.
- *Tourism sector.* Determination of the tolerance threshold of intensive tourism with respect to coastal development and implied urban development so as to effectively integrate environmental concerns and the potential negative impact on the coastal environment;
- *International trade sector.* Impact of conformity with environmental standards (in particular, EU standards) to determine the impact of changes (in input prices and manufacturing processes) on the production, exports, and imports of key sectors and especially on the competitiveness of small and medium-size Tunisian companies. The European Commission will finance a regional study on the assessment of the impacts of sustainability policies on trade. Tunisia will benefit from this study, which will be essential to ensure that free trade is in accordance with sustainable development principles and will not have negative impacts on social and environmental aspects. MAEHR has formed a trade and environment committee that might conduct these studies.

(iv) Development of new analytical tools.

233. In addition to SEAs, strategic planning should be based on a real and deep diagnosis of the causes and impacts of the sustainable development dimensions, in particular on the linkages between environment and poverty and between environment and economic growth. Tools should be developed to quantify environmental externalities (effects on damages caused to health or natural capital), and assess their costs and benefits and their impacts on sectoral policies. The tools proposed in chapter 2—cost assessment of environmental degradation, and adjusted net savings—are appropriate for underpinning decisions regarding priorities and the selection of sustainable development policies. These tools may serve as indicators to measure progress on the macroeconomic level of sustainable development. Tool methodology may be acquired with the World Bank's assistance, if a decision is made within MAEHR to establish a joint team in collaboration with other ministries, in particular the Ministry of Finance and the Ministry of Development and International Cooperation, as well as with universities and research institutes, with the allocation of appropriate resources. The application of these two tools will require the collection of data and measurement means for each environmental category (water, soil, coastal area, etc.), the development of measurement systems (for water and air), and the improvement of national observatories and laboratories such as TOESD, ICETT, and ONAGRI.

234. The development of these tools will require changes in the level of expertise of the personnel and a progressive modification of the skills of environmental personnel. New skills will be required in the field of environmental economics: economists, statistics specialists, and specialists in environmental policies will be needed.

6.4 The World Bank's role in the implementation of the proposed options

235. The World Bank's main objective in the field of environment in Tunisia is to assist the country in the integration of environmental concerns into key sectors of the economy, in particular in the sectors related to economic growth and poverty reduction. As mentioned in chapter 5, Tunisia is not a principal borrower for environmental projects, but it has benefited from technical assistance in creating institutions, developing strategies, initiating reviews of policy changes, and, recently, putting the experience it acquired regarding EIAs and the management of municipal solid waste at the service of the Mashreq and Maghreb countries. The overall analysis of the progress realized in the field of environment and natural resource management revealed that the main gaps concerned less technical, "softer," social and economic fields. The World Bank will be able to build on the assistance already granted to Tunisia to deepen the sustainable development objectives through the transfer of knowledge and with the assistance of other partners. The World Bank's intervention will be guided by the strategy principles of the Middle East and North Africa (MENA) Region (World Bank 2002b):

a. Mid-term Cooperation Strategy

A. Knowledge sharing. MENA Region activities will be based on knowledge sharing that will encourage Tunisia to adopt the goals and sub-goals analyzed in this report regarding modification of environmental policies and institutions. It will focus on five themes in which the Bank has a comparative advantage: (a) use of economic criteria and assessment of externalities; (b) linkages between trade and environment; (c) identification of sustainable development indicators; (d) monitoring of the goals of Millennium Development Goal 7; and (e) environmental protection and, in particular, SEA methodologies.

B. High impact strategic lending. The Bank's portfolio for Tunisia for fiscal 2004–6 includes two projects: a natural resource management project, and a project for drinking water supply in urban areas. The MENA Region will ensure that the goals and sub-goals defined in this report regarding integrated soil and water conservation are reflected in the components of these projects. Any water or sanitation project will have integrated into it an environment and health component that includes the development of waste water standards and economic instruments based on the polluter-pays principle.

C. Focus efforts on three priority fields: public sector efficiency and governance, private sector development, and water management.

- *Efficiency of the public sector and governance* are examined in the WSIL, and partially in the Gulf of Gabes marine resource protection project (FY 2004). For any future project, the MENA Region will ensure that the efficiency of MAEHR's environmental departments is improved through environmental management plans that any project which could have a negative impact on the environment will need to develop within the context of the Bank's environmental protection policy and in accordance with Decree 91-362, on EIAs. It will make sure that the participatory approach is enhanced within the scope of the natural resource project and that any natural persons or legal entities involved or affected, as well as NGOs, are consulted and informed of the EIA results.
- *Private sector development* will be strengthened within the scope of METAP activities under the regional project for technical assistance in integrated municipal solid waste, for which NEPA is the executing agency, and in the fields of trade and environment and finance and environment. International trade is increasingly affected by the environmental legal framework. The opening to international markets must be

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coupled with domestic liberalization to enable national companies to compete with international firms while taking into consideration the costs of environmental compliance. Private capital cannot develop without a stable regulatory and legal framework and an efficient banking system able to finance environmental projects at reduced risks. Private sector participation in infrastructure strategy, the manuals to be developed within the scope of the regional project on solid waste management, and METAP training in the banking sector will aim at initiating measures for the development of the private sector.

- In *water management*, sectoral studies on water and irrigated agriculture will be based on the expected outcomes of the sub-goals outlined earlier in this chapter. It is necessary to develop an integrated soil and water strategy that emphasizes the sustainability and quality of the resources, economic efficiency, the direct and indirect impacts of subsidies, the breakdown of water by user sector, and the integration of water quality into soil and water management.

D. Increased partnership: In order to have a significant impact, the MENA Region will continue to strengthen its collaboration within the World Bank group and with the financial partners for the implementation of the recommendations included in this report.

- Within the Bank, the MENA Region will involve the members of the Tunisia Country Team in the development and monitoring of environmental activities. It will intensify its collaborations in the water sector and the private sector with its peers in the Department of Infrastructure and Finance. It will collaborate with the Human Resources Development Department to monitor the MDGs and with the Economic Development Department Network on environment and trade-related activities. It will draw on the expertise of the central Environment Department Network on the development of sustainable development indicators and on environmental cost-benefit methodologies.

- Outside the Bank, the MENA Region will continue its close collaboration with the five METAP partners—the European Commission, the European Investment Bank, the United Nations Development Program, and the Governments of Finland and Switzerland—to provide a regional technical assistance program for water quality and coastal management, waste management, and the development of environmental policy tools such as environmental protection and linkages between trade and environment and between finance and environment. It will also consult other financial backers that are active in the environment field, in particular the German cooperation agencies, the GTZ and the KfW. Through these projects financed by METAP, it will involve NGOs and the media in training sessions and workshops and in consultative meetings.

E. Respond flexibly and rapidly. Environmental sustainability is one of the five MDGs with which the World Bank Group will align its portfolio. The MENA Region will accordingly continue its consultations with its Tunisian partners to assist them in the implementation of the study recommendations. For this purpose, the region intends to allocate in its financing plan for FY 2004–2006 an administrative budget of US\$100,000 to enable the Bank's personnel to continue the dialogue initiated by this study and to monitor an annual action plan jointly decided with MAEHR. Additional resources may be sought through the environmental anchoring fund or fiduciary funds in case the Tunisia group committee decides, after consultation with MAEHR, to conduct strategic assessment studies in the soil and water field and to integrate environmental dimension into the country assistance strategy (CAS) and the sectoral strategies.

236. The study stressed the necessity for Tunisia to (a) continue its efforts to integrate environment into coastal, soil, and water management programs and strategies and (b) develop a horizontal consultation and dialogue structure to integrate the sustainable development principle into economic policies while taking into account institutional constraints. For fiscal 2004, the MENA Region proposes to offer assistance in the following key fields.

b. Short-term Action Plan

A. Improve analytical activities through:

- The integration of appropriate recommendations from the study into the Bank's country assistance strategy (CAS), which will be presented at the World Bank's Board of Directors in FY 2004
- The preparation of an action plan for the implementation of the study as of FY 2005

B. Improve the performance of the following environmental components in the Bank's loan portfolio:

- The identification and quantification of WSIP development indicators regarding water
- The monitoring of environmental management plans in the fields of water, sanitation, and natural resources so as to reduce the Bank's risks.

C. Initiate the preparation of the natural resource project and complete the preparation of the Gulf of Gabes project financed by the GEF by emphasizing the Gulf strategic assessment study as a pilot example to be applied to other coastal areas.

D. Initiate a pilot project for harmonizing the EIA system with the World Bank's system by emphasizing the procedures and mechanisms to be developed so that the measures listed in chapter 4, such as public consultation and participation and the improvement of environmental management plans, become effective. Similarly, two to three projects in environmental category B will be selected to develop procedures with NEPA so that the latter can adapt its structure for a possible revision of environmental management plans on behalf of the World Bank.

F. Assist environmental institutions in the development of strategic environmental studies by building the analytic capacity.

G. Initiate a strategic environmental assessment (SEA) on tourism and the coast, which may be supervised by the NACP.

H. Initiate a cost assessment study of degradation related to water quality.

I. Pursue METAP technical assistance activities through the enhancement of the EIA regional center within ICETT by organizing training workshops on environmental strategic assessments for water and the coast; the implementation of the solid waste regional project by the regional group within NEPA; and training on water quality management and coastal management.

7. Conclusion

237. Given the magnitude of the problems identified, the successful implementation of the study's recommendations will require more than World Bank assistance, which is modest and has a primarily catalytic effect. In maintaining its commitment to sustainable development, Tunisia must develop a program that matches its ambitions and includes institutional, economic, and political reforms, as suggested in this study. This will require time, patience, and perseverance. Since environmental sustainability requires a long-term, integrated approach, the major benefits will only be seen in the long run. Therefore, Tunisia must first develop and implement the proposed reforms and a system for the assessment of their outcomes and impacts. The Bank should be prepared to accompany Tunisia throughout this long process.

Annex to Chapter 2 – Tunisia sustainability indicators within the global context

Table 2.1: Comparison of international development goals of 10 Mediterranean countries

Years 1999 or 2000 (unless otherwise indicated)	DEVELOPMENT INDICATORS OF MEDITERRANEAN COUNTRIES									
	Tunisia	Morocco	Egypt	Jordan	Lebanon	Turkey	France	Spain	Portugal	Greece
1 Eradicate extreme poverty and hunger										
Proportion of population below \$1 a day	2% in 95	2% in 90	3.1% in 95	2.0% in 95	*	2.4 in 95	*	*	2 in 95	*
Share of revenues or expenses for the poorest 20%	5.7% in 95	6.50%	9.8% in 95	7.6% in 95	*	5.8 in 95	7.2% in 95	7.5 in 90	7.3 in 95	7.5 in 95
Child malnutrition (% of children under five years of age)	9% in 95	9.5% in 90	4%	6.4% in 95	3 in 95	8.3	*	*	*	*
2 Achieve universal primary education										
Net enrolment ratio (% of the concerned age group)	98.20%	74.50%	92.30%	93.60%	70.9	96.2 in 95	100.10%	102.2	104.6	96.8
Proportion of pupils who reach grade 5	92.10%	81.90%	*	97.70%	91.3	94. in 95	98%	100 in 90	*	99.5 in 90
Literacy rate of 15-24 year-olds	93.40%	67.40%	69.80%	99.10%	95.2	96.5	*	99.8	99.8	99.8
3 Promote gender equality										
Ratio of girls to boys in primary and secondary education	93%	77.90%	87.70%	96.50%	99.7	78.1 in 95	95.1	97.8	97.4	95
Ratio of literate females to males among 15- to 24- year-olds	91.60%	76.60%	82%	100%	95.7	95.2	*	100	100	100.1
Proportion of seats held by women in national parliament	21%	*	11%	1% in 95	3	23	*	99	8.7 in 90	26
4 Reduce child mortality										
Under-five mortality rate (per 1,000)	30.2	59.6	52.2	30.3	30	46.2	5.9	6.2	7.7	8.2
Infant mortality rate (per 1,000 births)	25.8	46.6	41.8	25.3	25.5	34.5	4.4	3.9	5.5	5.4
Proportion of one-year-old children immunized against measles	84%	90%	95%	94%	88	80	*	93	96	88
5 Improve maternal health										
Maternal mortality ratio (estimated for 100,000 births)	70 in 95	390 in 95	170 in 95	41 in 95	130 in 95	55 in 95	20 in 95	8 in 95	12 in 95	2 in 95
Proportion of births attended by skilled health personnel	82%	40% in 95	46% in 95	97% in 95	89 in 95	81	99% in 95	*	100	*
6 Combat HIV/AIDS, malaria and other diseases										
Contraceptive prevalence rate (among 15- to 49-year-old women)	60% in 95	50% in 95	56.10%	50.3% in 95	61% in 95	63.9	70.7% in 95	*	*	*
Prevalence and death rates associated with tuberculosis (for 100,000 inhabitants)	37	119	39	11	24	38	16	59	53	22
Proportion of tuberculosis cases detected	79%	90%	25%	33%	72%	*	*	*	77	*

Table 2.1 (cont'd)

	DEVELOPMENT INDICATORS OF MEDITERRANEAN COUNTRIES													
	Years 1999 or 2000 (unless otherwise indicated)													
7 Ensure environmental sustainability														
Proportion of land area covered by forest	11.35 %	6.80%	0.10%	1 %	3.5	13.3	27.90%	28.8	40.1					27.9
Ratio of area protected to surface area	1.30 %	0.70%	0.80%	3.40%	0.5	1.3	13.50%	8.5	6.6					3.6
Energy use per unit of GDP	7.4	10	4.9	3.8	3.3	5.9	5.3	6.1	6.9					6
Carbon dioxide emissions (per capita)	2.4	1.2	1.7	3	3.9	3.2	6.3	6.3	5.5					8.1
Proportion of population with sustainable access to an improved water source	92 %	82%	95%	96%	100	83	*	*	*					*
Proportion of population with access to improved sanitation	81 %	75%	94%	99%	99	91	*	*	*					*
8 Develop a global partnership for development														
Telephone lines and cellular subscribers (per 1,000 population)	95.6	132.8	107.7	151.2	407.4	525.5	1,072.5	1,030.5	1,095.2					1,088.9
Personal computers in use (per 1,000 population)	22.9	12.3	22.1	22.5	50.1	38.1	304.3	142.9	299.3					70.5
General indicators														
Population	9.6 million	28.7 million	64.0 million	4.9 million	4.3 million	65.3 million	58.9 million	39.5 million	10.0 million					10.6 million
Gross Domestic Product (\$)	20.1 billion	33.9 billion	95.4 billion	8.4 billion	17.4 billion	201.2 billion	1.4 trillion	595.3 billion	111.3 billion					126.3 billion
GDP per capita (\$)	2,100 \$	1,180\$	1,490\$	1,720\$	4,010\$	3,080.0	23,810\$	15,080\$	11,120\$					11,960.0
Literacy rate of more than 15-year-olds	71 %	48.90%	55.30%	89.7%	86%	85.1	*	97.6	92.2					97.2
Fertility rate (births per woman)	2.1	2.9	3.3	3.7	2.3	2.4	1.9	1.2	1.5					1.3
Life expectancy at birth (years)	72.1 years	67.5 years	67.5 years	71.5 years	70.4 years	69.7	78.9 years	78.2	75.6					77.9
International donations (% of GDP)	1.20 %	1.30%	1.30%	6.60%	1.1	0.2	*	*	*					*
External debt (% of GNP)	57.10 %	55.30%	29%	97.60%	59.2	57.8	*	*	*					*
Investment (% of GNP)	27.40 %	24.40%	23.90%	20.0 %	18.1	24.4	20.60%	25.9	28.2					22.3
Trade (% of GNP)	91.60 %	68.60%	38.90%	109.50%	50.8	55.6	55.90%	62.2	74.7					48.7

Annex to chapter 2

Tunisia sustainability indicators within the global context

Table 2.4: Sustainability Development Index

	Country	Code	Rank	SDI	SYS	PRE	HUM	CAP	MON
Top five	Finland	FIN	1	73.9	78.7	57.7	84.9	86.1	54.9
	Norway	NOR	2	73.0	77.6	57.6	84.8	85.5	52.3
	Sweden	SWE	3	72.6	72.1	51.2	85.0	86.6	67.1
	Canada	CAN	4	70.6	90.4	47.0	85.0	75.2	39.5
	Switzerland	HEC	5	66.5	52.4	36.1	84.3	91.5	64.5
	Croatia	HRV	12	62.5	53.4	65.9	76.6	69.5	48.5
	Portugal	PRT	28	57.1	53.3	61.6	78.9	56.2	40.9
	France	FRA	33	55.5	50.7	34.6	82.2	68.8	54.7
	Spain	SPA	44	54.1	41.0	55.1	80.6	64.0	37.3
	Jordan	JOR	53	51.7	42.7	51.2	70.9	50.4	56.1
	Bosnia and Herzegovina	BIH	55	51.3	45.8	64.2	63.7	44.9	40.4
	Greece	GRC	60	50.9	43.7	49.6	81.9	48.4	45.4
	Tunisia	TUN	61	50.8	48.4	56.9	68.8	35.3	58.5
	Turkey	TUR	62	50.8	54.8	59.7	66.8	39.2	38.1
	Israel	ISR	63	50.4	39.2	35.2	80.4	63.7	50.2
	Algeria	DZA	70	49.4	50.3	60.2	64.2	32.0	49.8
	Morocco	MOR	72	49.1	33.2	59.2	60.4	43.9	60.7
	Egypt	EGY	74	48.8	53.8	48.4	62.1	34.3	57.0
	Italy	ITA	83	47.2	33.0	35.6	82.7	58.1	46.3
	Lebanon	LBN	106	43.8	35.5	35.4	74.8	46.7	45.4
	Syria	SYR	107	43.6	48.3	47.4	68.1	26.5	44.0
	Libya	LBY	124	39.3	53.7	31.2	62.2	33.0	26.8
	Saudi Arabia	SAU	138	34.2	35.0	28.8	76.2	33.6	18.2
	Iraq	IRQ	139	33.2	34.9	47.7	33.8	20.9	29.7
	North Korea	PRK	140	32.3	19.4	50.6	57.9	28.1	20.6
	United Arab Emirates	ARE	141	25.7	27.3	12.6	75.0	36.8	9.3
	Kuwait	KWT	142	23.9	19.1	10.2	76.5	36.5	14.4

SDI: Sustainable Development Indicator (Environmental Sustainability Indicator)

SYS : Environmental status (air, water – quantity and quality, biodiversity, occupation of territory)

PRE : Reduction of anthropic pressures (air, water, eco-systems, waste, demographic growth)

HUM : Population status (nutrition, access to drinking water, child health)

CAP : Institutional capacities (science and research, participation, policies, role of the private sector, co-efficiency)

MON : Integration into global efforts (institutions and treaties, greenhouse effect gas, reduction of cross-borders pressures)

Annex to Chapter 4 – Evolution of environmental policies and institutions

Table 4.2: Evolution of environmental institutions

Year	Organization	Field	Missions	Evolution	Major facts
1974	National Office of Sanitation (NAS)	Urban sanitation	Development and management of sewerage networks and sewage treatment stations	1993: in charge of water pollution control 1998: in charge of the management of four sanitary landfills	1975: establishment of sanitation fees 1979: conditions of waste discharges in networks 1985: conditions of waste disposal in receptor environment 1988: waste water guidelines in water environment 1989: conditions of the use of treated wastewater in agriculture (standards in 1990)
1975	Ministry of Agriculture (MA)	Water			Promulgation of the Water Code, completed in 1988
1981	Directorate of Environmental Health and Protection (DEHP), (in the Ministry of Public Health)	Drinking water Sea-water and tourism Sanitation and wastewater	Control and analysis of physical, chemical, and bacteriological qualities of water	1981: responsible for controls and standards 1983: establishment of health laboratories 1983: monitoring program for coastal zones and bathing waters	1982: establishment of operation standards for thalassotherapy centers 1983: bathing waters standards 1983: drinking water standards 1985: conditions of waste in receptor environment 1988: waste water guidelines in water environment 1989: conditions of the use of treated wastewater in agriculture (standards in 1990)
1985	Energy Management Agency (EMA)	Energy savings	Implementation of the energy savings policy Approval of investments in energy savings Control and monitoring of energy audits	1990: extension of mandates to renewable energy and geothermal energy 1998: becomes National Renewable Energy Agency (NREA) under the supervision of the Ministry of Environment and Land Use Planning (MEAT) 2000: mandate limited to cleaner, renewable, and alternative energies, as	1985: law encouraging the development of renewable energy 1987: institution of mandatory periodic energy audits 2001: conditions of acceptance of expert auditors

Year	Organization	Field	Missions	Evolution	Major facts
				well as to the reduction of atmospheric emissions 2002: comes under the supervision of the Ministry of Industry and Energy (MIE)	
1988	MA				Revision of the Forest Code Implementation decrees and decisions (1988-91)
1988	National Environment Protection Agency (NEPA)	Fight against pollution and environmental protection	Implementation of anti-pollution policy Approval of investments for pollution control Control and monitoring of waste Research, training, and education Approval of environment impact assessments	1993: management of the Depollution Fund (FODEP) 1994: management of the Solid Waste Management National Program (SWMNP) 1996: management of sanitary landfills 1997: management of the Environmental Management Fund for Packaging (EMFP) 1997: programs for the beautification of cities and roads	1990: attribution of judiciary powers to NEPA officers 1991: development and conditions of mandatory environment impact assessments 1993: establishment of the (industrial) Depollution Fund (FODEP) 1996: law on solid waste and producers' responsibility 2000: definition and nomenclature of hazardous waste 2001: conditions of waste collection, transport, and treatment
1991	Ministry of Environment and Land Use Planning (MELUP)	Environment and land use planning	The general policy and supervision of specialized institutions	1993: definition of functions and organization 1994: organization and attribution of external services 2002: dissolution and affiliation of services with the Ministry of Agriculture, Environment and Hydraulic Resources (MAEHR), the Ministry of Equipment, Housing and Land Use Planning (MEHLUP), and MIE	1993: creation of the National Sustainable Development Commission (NSDC) 1994: Code for territory development and town planning 1998: delimitation of areas subject to master plans (agglomerations and sensitive areas)
1992	MA				Law on plant protection (use of pesticides, insecticides, etc...)
1993	MA				Creation of 16 natural reserves
1994	MA				Law governing fisheries (modifications between 1995 and 1999)
1995	National Agency for Coastal Protection (NACP)	Management of the coastal area (not yet zoned)	<ul style="list-style-type: none"> Implementation of the coastal protection and management policy Control and property regularization Studies and observation of 	2002: transfer to MEHLUP	1995: law on Public Maritime Domains (MPD) 1998: definition of sensitive coastal areas 1998: launching of property inventories (management) 2000: completion of MPD delimitations

Year	Organization	Field	Missions	Evolution	Major facts
			the coast – Approval of developments, equipment, and constructions – Development and management of sensitive areas		2000: property regularization procedures
1995	MA	Soil and water conservation			Law on soil and water conservation (SWC) and SWC regional groups
1996	International Center for Environmental Technologies in Tunisia (ICETT)	Technology and knowledge in environment	Transfer of cleaner technologies Training, research, and technical support Consulting, experimentation and documentation		
1999 2001	MA MA				Law on biological agriculture Law organizing and defining the missions of the Ministry of Agriculture and its services, in particular the General Directorate of Forests (GD/F), the General Directorate of Rural Engineering and Water Exploitation (GD/REWE), and the General Directorate of Development and Conservation of Agricultural Lands

Annex to Chapter 4 - Development of environmental policies and institutions

Table 4.3: Environmental activities and corresponding institutional mechanisms

Field	Institutional mechanisms				Activity		
	Policies and programs	Legal bases	Institutions	Planning/ Execution	Control and prevention	Monitoring of achievements and their impacts	Information collection and upgrading
Forest management	Reafforestation and protection Inhabitants and residents association	Forest code Implementation decisions (usage rights, concessions, ...)	MAEHR: general directorate of forests Regional districts of forests (RD F) REF NGO : AFIC (GFIC)	Planning: GDF Forest works: RAF (CRDA) Exploitation: REF + private + collective interest forest associations	RD F (CRDA)	RD F (CRDA)	RD F (CRDA) Forest and pastoral inventory (1994)
Soil and water conservation	Development of watersheds Programming of intervention perimeters Program of 1,000 collinear lakes Refill / sewage of flood water	Soil and water conservation code Water code	National Council for Soil and Water Conservation MAEHR: general directorate of conservation of agricultural lands SWC regional districts (SWC RD) Regional groups (RG/SWC) and local associations (LA) of SWC	Planning: GD/DCAL + RD SWC + RG/SWC SWC works : RD SWC + LA SWC + private	Watershed specific studies RD SWC	Achievements: RD SWC Impacts: occasional, non- systematic monitoring	Non-systematic information on the degrees of erosion and salinity (specific studies)

Field	Institutional mechanisms			Activities			
	Water national strategy	Water code	Water national council	Planning : GD/REWE DHMPE	GD/DMHW GD/WR	Realizations : NEPA (FODEP) NAS	CADRIN (industrial and hydric waste), NAS
Water managements, savings, pollution, quality	– Irrigation water savings national program	– Laws governing the creation and missions of the NAS and NEPA	– MAEHR : GD/DMHW, GD/REWE, GD/WR, NEPA, NAS	Realization : RD Water	NAS (1993 law)	Impacts : Occasional analyses and measurements; absence of monitoring network	Occasional analyses and measurements; absence of monitoring network
	– Treated waste water re-utilization programs	– Specifications for irrigation waters (PPI)	– MPH : DHMPE	Management : PPI : RD Water, some CIG in PPI	RS/DHMPE Health laboratories	Private perimeters : CIG (ex-CIA)	(specified by WSIP)
	– Anti-vectorial national program	– Decree 74-1964	– Regional district of water	Health laboratories RS/DHMPE		Few measures on soil salinity by charged water (tests)	DHMPE and RS
Energy savings	– National program for the fight against diseases of hydric origin	– Decree 81-71	– Hydraulic interest groups			DHMPE : Control of water quality in P1	
	– Energy savings program		– Collective interest groups for irrigation (ex ACI)				
	– Renewable energies programs		– Regional services of the DHMPE				
Drinking water (DW) in urban areas	– Cogeneration development programs	– Law on energy management and its amendments	MIE : GD/E NREA STEG	Planning : GD/E ; STEG		Regular monitoring of specific consumptions (STEG)	File : obligation of declaration of heavy consumers (three segments)
		– Decree imposing mandatory audits		Realizations : STEG, NREA		Assessment of savings (NREA)	
	– Sonede programs : reduction of losses, improvement of	– Law governing the incorporation of the Sonede	Sonede	Sonede	Sonede Ministry of Public Health	Sonede Ministry of Public Health	Consumers file (Sonede) Regular analyses

Field	Institutional mechanisms				Activities			
	quality (salinity), desalination	Water code Pricing Decreases on audits						(Sonede and MPH)
Drinking water (DW) in rural areas	DW programs National program for the fight against diseases of hydric origin	Water code Obligation of constitution of a GIS for each DW network in rural areas Decree 74-1064 Decree 81-783 Specifications for the use of wells waters	MAEHR : Sonede, GD/REWE, Regional services of the CIG NSF CIG/DW DHMPE + RS of health	Planning: GD/REWE Execution : Sonede, RS CIG Financing : NSF Management : CIG DHMPE	Sonede RS CIG Ministry of Health	Realizations: centralized by the GD/REWE DHMPE :sanitary inspection of networks and works Water quality control	GD/REWE	
Pollution control	<ul style="list-style-type: none"> - Reduction programs :hydric and air - pollution, soil contamination - Program for the prevention of diseases associated with environment 	<ul style="list-style-type: none"> - Environmental protection law - Laws governing the creation of the NEPA and NREA - Laws on waste in the environment - Standards for waste water, cement emissions, ambient air - Laws on environment impact assessments - Decree 74- 	MAEHR : GD/PEQV, NEPA, NAS, NREA MPH : DHMPE	Planning and coordination with industrialists: MAEHR, NEPA-FODEP, NAS (industrial zones) Implementing agencies: private industries, NAS (STEP) DHMPE in coordination with NEPA	NEPA (control and impact assessments) NAS (waste analysis, program-contracts) NREA (air) ICETT (air) DHMPE : analysis of the quality of ambient air	Implementing agencies: NEPA, NAS, NREA Impacts: non systematic	Non-permanent inventories and sectoral studies	

Field	Institutional mechanisms			Activities			
		1964 – Decree 81-71					
Waste management	SWMNP PEMF Hospital waste management national scheme	Law on waste and control of their elimination Organic laws on districts Nomenclature of hazardous waste	Municipalities (household refuse) NEPA NAS DHMPE and hospitals (hospital waste) SOTULUB, Industrial and private	Planning : NEPA Execution : NEPA, NAS, CL Management : LC, NEPA, NAS, private collectors and recyclers DHMPE and RS	NEPA	Implementing agencies: NEPA Impacts : non systematic	Non-permanent inventories and sectoral studies
Coastal protection	– Sensitive areas management programs – Property management programs – Coasts rehabilitation and restoration projects – Monitoring of bathing water quality	Code of territory development and town planning DPM law Law governing the creation of the NACP OMS directives	MEHTD : GD/TD, NACP MTCH: AFT Local collectivities OMMP DHMPE + NACP	Planning : GD/TD, NACP, ONTT (tourism) Execution : NACP Management : NACP, LC, GD/F (humid areas) DHMPE : sea water monitoring network	NEPA (impact assessments) NACP DHMPE	NACP DHMPE	NACP DHMPE

Annex to Chapter 4 - Evolution of environmental policies and institutions

Figure 4.1: Breakdown of NGO projects' amount by sector

Figure 4.2 : Breakdown of NGO project amount by international donor

Annex to Chapter 5 – Environmental public expenditure

Table 5.2 : External financing (in millions of current dinars)

Beneficiary	VIII Plan	IX ^c Plan	Ten years
MA	50.18	125.16	175.35
MELUP, of which:	186.68	231.70	368.37
Head office	2.69	6.12	8.81
NEPA	12.66	15.00	27.67
NACP		2.22	2.22
ICETT	1.52	9.62	11.14
NREA	1.46	3.65	5.11
NAS	118.35	195.08	313.43
Direct	42.60	77.33	119.93
Total	229.46	434.19	663.65

Table 5.3: Share of external financing in total investments

Beneficiary	VIII Plan	IX ^c Plan	Decade	Form of financing
MA	17.3%	25.7%	22.5%	Loans (80 % multilateral)
MEAT, including	49.5%	47.8%	48.4%	
Head office	14.7%	22.5%	19.4%	Donations (1/4 multi-, 3/4 bi- lateral)
NEPA	65.7%	62.0%	63.6%	Donations (2/5 multi-, 3/5 bi- lateral)
NACP		22.5%	22.5%	Donations (1/2 multi-, 1/2 bi- lateral)
ICETT	89.3%	73.4%	75.2%	Donations (1/7 multi-, 6/7 bi- lateral)
NREA	34.4%	16.6%	19.5%	Multilateral donations
NAS	50.8%	50.3%	50.5%	1/4 donations : 3/4 loans
Direct	82.2%	96.8%	91.0%	2/3 loans, 1/3 donations
Total	37.1%	41.3%	39.7%	

Table 5.4 : Share of beneficiaries in global external financing

Beneficiary	VIII Plan	IX ^c Plan	Decade
MA	21.9%	28.8%	26.4%
MEAT, including	59.6%	53.4%	55.5%
Head office	1.2%	1.4%	1.3%
NEPA	5.5%	3.5%	4.2%
NACP		0.5%	0.3%
ICETT	0.7%	2.2%	1.7%
NREA	0.6%	0.8%	0.8%
NAS	51.6%	44.9%	47.2%
Direct	18.6%	17.8%	18.1%
Total	100.0%	100.0%	100.0%

Annex to Chapter 5 – Environmental public expenditure
Table 5.8: Environmental active projects financed by the World Bank

Fiscal year	Project name	IBRD loan amount (millions US\$)	Total project cost	Goal	Environmental development indicator
1995	Water supply and sanitation	58.0	110.9	<ul style="list-style-type: none"> – Management of demand and institutional strengthening, which would improve the management of water resources, as well as the current operations and finances of SONEDE and NAS. – Supply adequate services in water supply and sanitation in urban and rural areas and improve services. – Promote the reutilization of wastewater in irrigation and industry. – Encourage the subcontracting of some operational activities of SONEDE and NAS to the private sector. 	<p>Number of inhabitants with access to water: 7.3 million</p> <p>Number of inhabitants with access to sanitation: 5.2 million</p>
1995	Rural roads	51.5	88.7	<ul style="list-style-type: none"> – Reduce revenue gaps between urban and rural regions by improving access to markets, creating favorable conditions for increased investments in agriculture, and improving the delivery of social services to the poor rural population. – Decentralize the management of local and rural roads and ensure financing and appropriate maintenance while improving budget discipline, transparency, and accountability in the road sector. – Promote private sector participation in road works in general and, on a pilot basis, in the maintenance of unpaved rural roads. – Adopt construction and maintenance standards for rural roads by reducing costs 	<p>Kilometers of rehabilitated roads 300</p> <p>Kilometer of macadamized roads 300</p>
1997	Water supply in Greater Tunis	53.0	107	<p>Improve the level of urban sanitation service..</p> <p>Promote the efficient reutilization of the effluents of wastewater sewage treatment stations.</p>	<p>Volume of collected water: 206 million cubic meters</p> <p>Volume of treated water: 206 million</p>

Fiscal year	Project name	IBRD loan amount (millions US\$)	Total project cost	Goal	Environmental development indicator
				Reduce urban and coastal pollution. Improve cost recovery and NAS financial capacity, with a long-term goal of financial autonomy. Introduce appropriate new sanitation technology. Develop private sector participation in the sanitation sector.	cubic meters Percentage of the use of treated waters: 32
1997	Second municipal development project	80	220	<ul style="list-style-type: none"> Improve the services and infrastructure of Tunisian municipalities. Improve the efficiency of public sector management on the local level. 	No environmental indicator
1998	Second investment loan in the agricultural sector	42	69.3	Increase rural revenues through sustainable use of water resources and improved agricultural techniques. Upgrading research and popularization of the research.	Volume of underground water extraction: 745 cubic meters per year Mobilization of renewable additional water: 9.6 cubic meters per year Improvement of irrigation efficiency: no indicator
1998	Transport sector investment loan	50	82	<p>Improve the efficiency and quality of transport services by increasing and modernizing transport equipment, by introducing market structures favoring competition in the provision of transport services, and by reducing the impact of transport activities on the environment.</p> <p>Reduce the financial burden represented by the transport sector in the state budget by increasing private sector participation in transport investments and provision of services and by improving the performance of the remaining public companies.</p> <p>Promote integrated management of water resources. Promote the conservation of water resources.</p>	Percentage of leaded gas: 6.96%
2000	Investment loan in the water sector (WSIP)	103	285		<ul style="list-style-type: none"> Efficiency of the improvement of water conservation mechanisms (no indicator) Availability of water resources (no indicator) Reduction of water consumption (no indicator) Use of groundwater to reach a

Fiscal year	Project name	IBRD loan amount (millions US\$)	Total project cost	Goal	Environmental development indicator
					sustainable level – Monitoring of corrective actions for soil intrusion – Warning system, quality and quantity of salinity and groundwater – Identification of water pollution sources – Water quality monitoring system
2001	Transport sector investment loan	37.6	57	– Improve the economic efficiency and quality of transport services by supporting the reforms introduced to simplify the management of the sector, increase competition, and widen access to the sector, while implementing protection measures against the negative impacts on the environment of uncontrolled growth of transport services. – Reduce the financial burden represented by the transport sector in the state budget by encouraging private sector investment and participation in the provision of transport services, while improving the performance of public companies.	Percentage of the use of public transport: 20% Share of public transport in motorized routes: 50%
2001	Cultural heritage	17.0	23.79	– Strengthen the legal and institutional framework to ensure efficient management of the country's cultural heritage. – Develop and market cultural products, using, among other means, communication and promotion programs. – Improve infrastructure and management in a representative sample of six archeological and historical sites to increase their attraction and tourism potential.	Participation of local associations in Kairouan and Djerba
2001	Agriculture support services	21.3	42.4	Strengthen, on a pilot level, the capacity of agricultural professional organizations to enable them to better offer the services for which producers created	Efficiency of pesticides control Reduction of pesticide doses

Fiscal year	Project name	IBRD loan amount (millions US\$)	Total project cost	Goal	Environmental development indicator
				<p>them.</p> <p>Strengthen the institutional capacity and quality of the agricultural services provided by public and private organizations and producers.</p> <p>Improve the flow of information for all stakeholders in the sector.</p>	
2003	Northwest Mountains Development Project	34	44.86	<p>Improve the socioeconomic conditions of communities in mountain and forest areas of the northwest region while ensuring sustainable management of natural resources.</p>	<ul style="list-style-type: none"> - Improvement of vegetation and forest coverage - Percentage of increase of harvest production - Surface area of lands intended for soil and water conservation - Kilometers of rural roads
2003	Third municipal development	77.39	199.77	<p>Strengthen the institutional environment to enable the completion of infrastructures and basic municipal services through (a) increased financial resources and the strengthening of the institutional capacities of the Municipalities Support and Loan Fund (MSLF), in charge of financing municipal investment, and (b) the strengthening of the institutional capacities of local collectivities and national entities in charge of the sector.</p>	<p>Increase in the number of public parks: 15 square meters per person</p> <p>Increase in the number of controlled development areas from 1 to 6</p>

Annex to Chapter 5

Environmental public expenditure

Table 5.9. Projects financed by the METAP

FISCAL YEAR	PROJECT NAME	DONATION AMOUNT \$	GOAL
93	Study on the marketing of the wastewater treatment plan products	230,000	– Develop an autonomous framework for the exploitation of wastewater treatment stations products
92	Hazardous waste management study	216,000	– Study on a) the management of toxic and hazardous waste through the identification and assessment of appropriate procedures of collection, transport, storing, treatment and disposal.
94	Marine pollution control study	108,000	– Implement a marine pollution control system to monitor and prevent pollution produced by hydrocarbons.
95	Industrial pollution study	175,000	– Develop an industrial pollution control system to contribute to economic growth
96	Natural resource management strategy study	26,000	– Assessment and technical support for the preparation of the main study on natural resource management strategy
96	Natural resource management strategy study	59,000	– Identification of existing natural resources and environmental constraints to future economic growth and formulation, on this basis, of appropriate recommendations
97	Lagoons and coastal zones protection study	90,000	– Inventory of coastal lagoons and eco-systems of the areas in the region of Hammamet to study their specificities, assess their ecological potential, identify existing threats and formulate proposals for appropriate preventive measures
98-00	Trade and environment	138,000	The analysis study aims at rapidly assess the impact of changes in the production general costs due to the compliance with more strict environmental standards.
00-03	EIA regional center within the ICETT	440,000	Establish an environmental impact assessment regional center for training, technical support and the establishment of a database
00-01	Feasibility study of a public/private partnership for the collection and valorization of plastic packaging in Great Tunis	98,000	Recommend a legal status to the public/private partnership and provide technical solutions to manage plastic packaging waste.
01-03	Cost assessment of environmental degradation	50,000	Quantitatively assess the damages resulting from environmental degradation

Annex to Chapter 6 – Priority fields

Table 6.1 Summary table of the status of strategic policies and goals

Field	Major goals	Knowledge status	Coverage by the identified or current programs	Potential and completion schedule	Specific recommendations (Priorities in boxes and in bold)
Drinking water in urban areas	Quality improvement (South) Reduction of losses Consumption savings	Satisfactory Satisfactory Under assessment	Complete Complete To be completed	Total in the middle-term Total in the middle-term According to audits and programs results	
Drinking water in rural areas	Extensions Access to the public network Quality improvement	Needs identified Assessed potential (Sonede) Analyses to be strengthened and systematized	Almost complete Almost complete Incomplete and occasional	95 % in 2010 45 % in 2010	Improve the GIS management capacities
Sanitation	Network extensions Treatment of domestic and industrial waters	Satisfactory To be completed (industries)	Complete Almost complete	85 % in 2006 2006 : 91 % treatment, 35 % re-utilization	Improve (NAS) financial situation
Energy savings and pollution (GES)	Improve energy efficiency Contribution of renewable energies Reduce the proportion of GES missions	Satisfactory Real potential to be completed	Almost complete Partial	To be determined 25 % in 2010	Fiscal and financial incentives
Pollution control	Reduction of pollutions Prevention (EIA)	Satisfactory Incomplete inventories Real effects unmeasured	Partial for transport Major projects Yes According to industrialists needs and financing means	1 200 TECo ₂ in 2010 NA NA	Fuel pricing Strengthening and extension of control and measurement networks (impact assessment)
Waste management	Generalize treatments Partial valorization	Complete for ordinary waste Under assessment for the others	Almost complete for urban household refuse Partial for special and industrial waste	80 % in 2010 Approximately 50 % in 2006	Establishment of cost recovery system Management structures to be created or strengthened
Forests	Extension, protection and valorization	Complete (1994)	Almost complete	4,4 % of the territory (+25 %) in 2006 of forests (afforestation) ; 13 % of « forest » coverage	
Soil conservation	Reduce wind and hydric erosion due to streaming Prevent soil salinity (PPI and PP)	Inventories to be updated (more recent : 1991) Inventories to be drawn up (in progress)	Programs decreasing for the 10 future years Cf. irrigation water management	550 000 ha treated before 2011 + 500 lakes To be determined (?)	Required reflection: agricultural development and environmental impacts Integration into water quality management strategy

Annex to Chapter 6 – Priority fields

Table 6.2 : Priorities for actions and supporting measures

No	Tunisia policy orientations (report presented in Johannesburg, abstracts and comments)	IDENTIFIED PRIORITY FIELDS AND EXPECTED SUB-GOALS			
		1. Soil conservation (erosion and quality)	2. Water management (savings and quality)	3. Coast preservation and tourism	4. Waste management (household and special)
A	Improve the change anticipation and strategy capacities within the context of globalization	A1 : Assess the impacts of the future evolution of protection and subsidy systems on the sale and purchase of agricultural products and on the changes induced on the soil cultivation use	A2 : Idem with deepening of valorization according to the required quality of irrigated products	A3 : Improve tourism profits by ensuring to targeted clients a quality environment meeting their future expectations	
B	Increase coordination and synergy between economic development policies and sustainable development	B1-2 : Integrate "soil and water" heritage conservation concerns and agricultural production support into the relevant development strategies by incorporating possible and/or inevitable re-conversions		B3 : Ensure equilibrium between quantitative development of tourism and preservation of the coast quality (strategic impact assessments based on tolerance thresholds)	
C	Develop tools for a better integration of environmental costs and profits into development (economic simulations and modeling)	C1 : Conduct a predictive comparison between SWC current costs and productions value added, and the costs of introduction of new cultivations and possible temporary decrease of revenues (adaptation subsidies)	C2 : Conduct a predictive comparative assessment of the subsidies to water savings and the possible negative impacts (salinity) on the profitability and quality (value added and export potential) of irrigated products.	C3 : Assess the value added brought by a better environment to tourism businesses (clients' propensity to pay) and the costs (investment and operation)	C4 : Provide one of the elements of the mentioned assessment by determining the economic cost for the collectivity of an improved management (including impacts on jobs and revenues of specialized micro-companies)
D	Ensure a better mobilization of international cooperation in favor of sustainable development	D1-2 : Encourage the transfer of knowledge and experiences: technical and economic modeling, adaptation of proven protocols, etc.			D4 : Encourage the transfer of knowledge and experiences
E	Improve governance on the local level and involvement (of groups) of the Tunisian civil society	E1-2 : Increase or encourage the effective participation of farmers' groups in the orientations and selections concerning the development of their activities			E4 : Develop inter-communality and raise the awareness of city dwellers and industrialists as to the financial implications of their behaviors
F	Develop new information systems for decision-making and the monitoring of results and impacts	F1 : Develop and maintain a soil evolution interpretation and measurement system (through C1)	F2 : Develop and maintain a water quality monitoring and measurement network and system (through C2)		

REFERENCES

1. Official Gazette of the Republic of Tunisia, years 1974 to 2002
2. State budgets, title II and special Funds, years 1990 to 2002
3. Budgets of the National Office of Sanitation , balance sheets, operating accounts and activity reports, years 1990 to 2001
4. Budgets of the Tunisian Society for water exploitation and distribution, balance sheets, operating accounts, and activity reports, years 1990 to 2001
5. WSIP sectoral environmental analysis, Buursink, 2000
6. Natural Resources Priorities, World Bank, 1997
7. The degradation of land and hydraulic resources. Environmental report and national action plan, World Bank, 1989
8. Environmental and sustainable development national action plan. Agenda 21, 1995
9. Water economy 2000, DG/ETH, 1991
10. Water code, Official Gazette of the Republic of Tunisia, 1987
11. Soil and water conservation national programs , 1987 and 1999
12. Water savings and consumption perspectives , DG/EGTH, 2001
13. National report RIO + 10 : August 2001
14. National annual reports on « Status of environment in Tunisia »: years 1993 to 2002, METD
15. Drinking water in the 8th Plan, SONEDE, and MDE, June 1991
16. Program contract between the State and SONEDE 1992 – 1996, February 1994
17. Retrospective of the 9th plan (in Arabic), note attached to the preparation documents of the 10th Plan, SONEDE, (undetermined date)
18. Pre-final report : drinking water in the 10th Plan, SONEDE, April 2002
19. Statistic reports Year 2000, SONEDE., July 2001
20. Water savings seminar, SONEDE, 1998
21. 30th anniversary of SONEDE, 1998: various communications
22. SONEDE investment tables from 1991 to 2001 and status of current loans.
23. Economic study on drinking water in Tunisia (H. Lahouel, coordinator and al.), SONEDE, 1994.
24. Documents of the Sousse seminar on water quality, SONEDE, 2002
25. Water savings at home, SONEDE, 2000
26. Documents of the seminar on industrial environment management, METD, 1997
27. Projects and studies 1992 –2001, Directorate of the Industrial Environment, METD, 2002
28. Financial report of the Depollution Fund FODEP, as of end 2001.
29. Note (in Arabic) on the FODEP and its perspectives (undetermined date)
30. Solid waste management, proposal of financial and institutional reforms, METD, 1998
31. Activity report 2001, NEPA, Solid Waste Department, 2002
32. Table on the financing of solid waste projects, NEPA, Solid Waste Department, (undetermined date)

33. Note on solid waste, F. Ghariani
34. 2000 annual report, NAS
35. Notes (in Arabic) : Presentation of the realizations of the 9th Plan, NAS, May 2001
36. Annual report on NAS subscribers, May 2001
37. 2000 annual report on the exploitation of sanitation networks and infrastructures, NAS, October 2001
38. Report on the 10th Plan and 2002 budget, NAS, January 2002
39. Sanitation programs during the 9th Plan, NAS, 1997
40. Study on the Economic Assessment of Environmental Degradation in Tunisia, World Bank, 2003
41. National Agenda 21
42. Med Agenda 21
43. Annual report on the agricultural and food product development in the Mediterranean Region, CIHEAM, 2000.
44. Documents of the 2nd seminar of the I'N.A.T centenary.
45. Soil and water conservation national strategy, 1990-2000
46. Assessment of water and soil conservation activities in Tunisia, FAO-D/CES, 1990
47. Study of the water sector, Bechtel-Lahmayer-SCET, 1999
48. Water 2000, 1991
49. Study on the safeguard of 20, 000 ha of oasis, 1995
50. Assessment study of the fight against desertification in agricultural and rural development projects
51. Evolution of soil salinity in Tunisia PPI, A. Mtimet and al., 1999
52. Cost price and pricing of irrigation water, CNEA-BRL, 1997
53. Monitoring of sustainable development and environment indicators by the TOESD, Slim Boujemaâ, 2003
54. National study on biological biodiversity in Tunisia, MELUP, 1998
55. Report on environment and National action plan », 11 volumes, World Bank, November 1989
56. Study on the air quality and air pollution in Tunisia, MELUP, 1999
57. UNDP complementary document, for the National Environment Protection Agency, « Action program — Memorandum for financial backers », Comete Engineering, September 1990
58. The Environment and the Millennium Development Goals, World Bank, 2003
59. Report of the commission « Forests and Sustainable development», in preparation of the NSDC meeting, 2003
60. Report of the commission « Agriculture and Sustainable development », in preparation of the NSDC meeting, 2003
61. Report of the commission « Fishery, aquaculture and Sustainable development », in preparation of the NSDC meeting, 2003
62. Report of the commission « Industry and Sustainable development », in preparation of the NSDC meeting, 2003
63. Report of the commission « Cities and Sustainable development», in preparation of the NSDC meeting, 2003
64. Report of the commission « Tourism and Sustainable development », in preparation of the NSDC meeting, 2003
65. Sectoral note « Forests and routes», Mohamed Salah Bachta, 2002
66. Sectoral note « Soil and water conservation », Mohamed Salah Bachta, 2002
67. Sectoral note « Irrigation water management », Mohamed Salah Bachta, 2002

68. Sectoral note « Drinking water in urban areas », Tahar Dalloua, 2002
69. Sectoral note « Drinking water in rural areas », Tahar Dalloua, 2002
70. Sectoral note « Eneregy resources », Tahar Dalloua and Bernard Mosnier de Rochechinart, 2002
71. Sectoral note « Air pollution », Tahar Dalloua, 2002
72. Sectoral note « Hydric pollution and sanitation », Tahar Dalloua, 2002
73. Sectoral note « Solid waste management », Tahar Dalloua, 2002
74. Sectoral note « Territory management », Bernard Mosnier de Rochechinart, 2002
75. Sectoral note « Coast and tourism management », Bernard Mosnier de Rochechinart, 2002
76. Sectoral note « Fishing resources », Mohamed Salah Bachtta
77. « Accounting for Sustainability », Kirk Hamilton, World Bank, 2003
78. « Tunisia – Trends and composition of saving », Kirk Hamilton, World Bank
79. 1995 partnership agreement between Tunisia and the European Union (French text)
80. General census of population and housing, INS, 1994
81. Cost Assessment of environmental degradation in Tunisia. Draft report, Maria Sarraf and Bjorn Larsen , 2003
82. Country Economic Memorandum, Volumes I & II, two volumes, World Bank Report N° 14375-TUN, October 1995
83. Natural Resource Priorities, World Bank Report N° 171, 71-TUN, December 1997
84. Arab Republic of Egypt: Cost Assessment of Environmental Degradation. World Bank Sector Note, Report N° 25175. 2002.
85. Larsen B., Bolt K. and Sarraf M., Cost Assessment of Environmental Degradation in Syria. Draft report, 2003.
86. Environmental Sustainability Index, « Yale Center for Environmental Law and Policy, Yale University » and « Center for International Earth Science Information Network, Columbia University », 2002
87. World Bank SIMA database
88. WSIL (Water Sector Investment Loan), assessment reports, World Bank, 1997
89. GD/REWE communication for issue # 2 of « Notes of the Blue Plan », special issue for the 3rd World Water Forum, Kyoto, February 2003
90. Water Scarcity in the Twenty-First Century (David Seckler et al.,1999)
91. Decree date February 13, 2001 governing the organization and missions of the Ministry of Agriculture and Hydraulic Resources
92. Natural Resource Management Project (NRMP), assessment reports, World Bank
93. Soil and water conservation in Tunisia, article published by the FAO, SD Dimensions, Jean Bonnal, 1998
94. Forest development project II (1994-2001), assessment reports, World Bank
95. Water savings in the oasis of Gabes managed by CIAs, Comete Engineering, 1994
96. «Tunisian coasts», R. Paskoff, A. Oueslati and al.
97. Tourism development and environment preservation », Société du Canal de Provence-Comete Engineering, 1994
98. Tourism development strategy, World Bank, 2003
99. PARNP (Popular areas rehabilitation national program)
100. METAP study on the municipal solid waste management in Great Tunis, Ernst-Basler, February 2003
101. Study on the management of hazardous waste treatment stations, Tecsalt, January 2003

102. National report on the assessment of Tunisia realizations for sustainable development and implementation of Agenda 21. Ministry of Environment and Land Use Planning, August 2001
103. Modernization of the management of irrigated perimeters in the governorate of Sousse, Comete Engineering, 1998
104. Rural development national strategy, Comete Engineering, 1998
105. FODEP 2001 assessment, 2002
106. International cooperation and financing of environmental projects, situation, Ministry of Environment and Land Use Planning, 1998
107. EECCA Environment Strategy, EAP Task Force, OECD, 2002
108. World Bank Public Expenditure Manual, 1998
109. Environmental national action plan, September 1990 (NEPA, UNDP, Comete Engineering)
110. « Experience in NEAP execution 1990 », World Bank, February 1995
111. Development of agricultural supporting services, CNEA-Comete, 1999
112. « Economic development in Tunisia - 2002-2006 », project sheets, MDIC, April 2002
113. Rehabilitation and modernization of the small perimeters of the governorate of Kasserine, Comete Engineering, 1996
114. Background paper EECCA Environment Strategy, EAP Task Force, OECD
115. Atlas of Tunisian soils, A. Mtimet, 1999
116. Middle East and North Africa Region Strategy Paper, World Bank, March 2002
117. Study on the natural resource management in Tunisia, agricultural use alternative scenarios, M. Salah Bachta, B. Thabet and A. M'hiri, 1996.
118. World Bank report: « Republic of Tunisia : Towards the 21st Century- Country Economic Memorandum (In Two Volumes).» Report No. 14375-TUN. October 1995.
119. World Bank report: Republic of Tunisia: Natural Resources: Status, strategies, and priorities.» Rapport No. 17171-TUN (Green Cover). December 1997.